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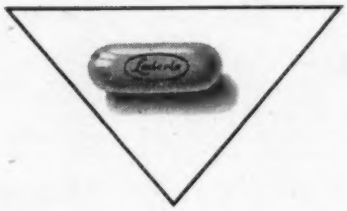

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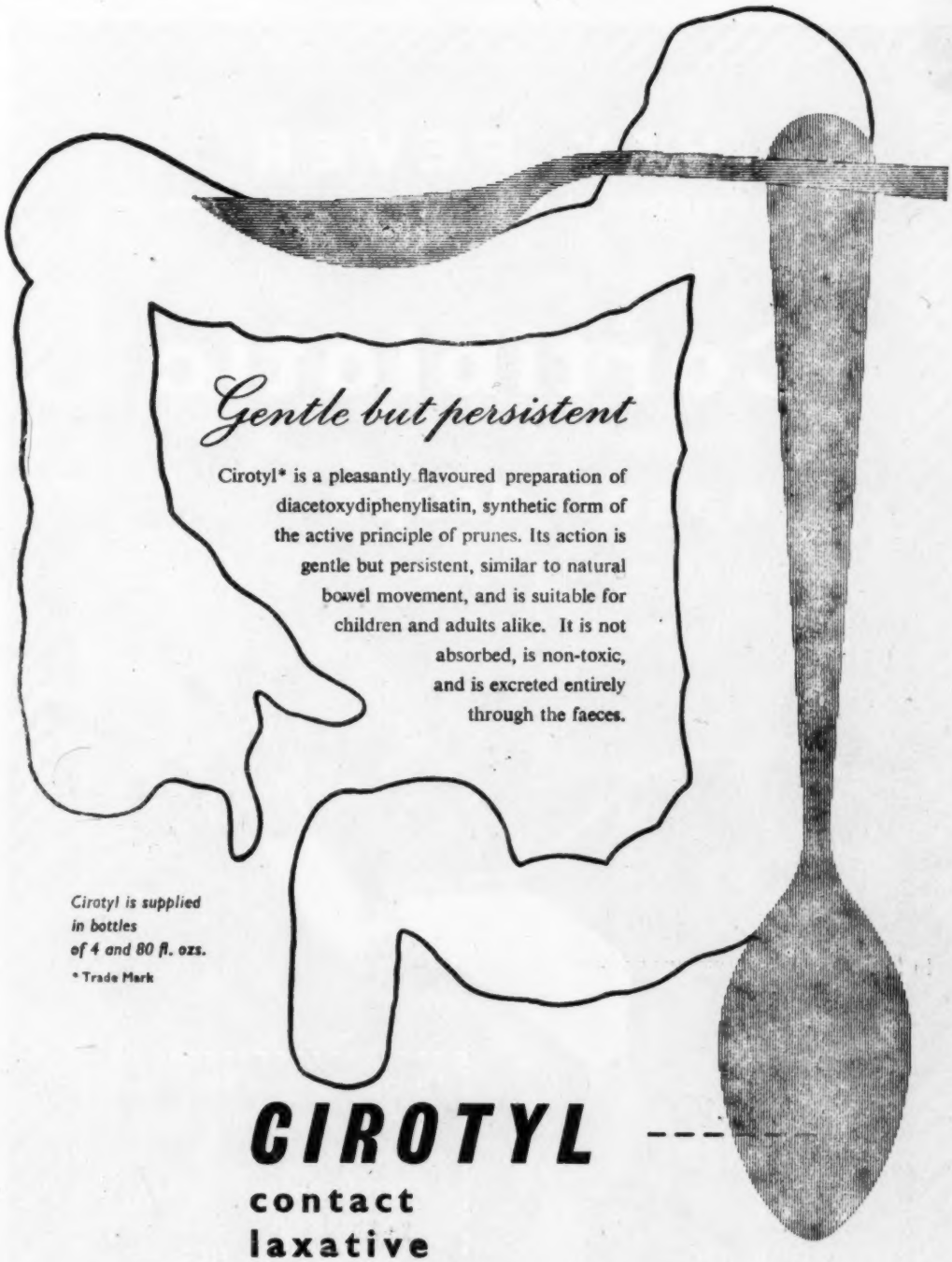

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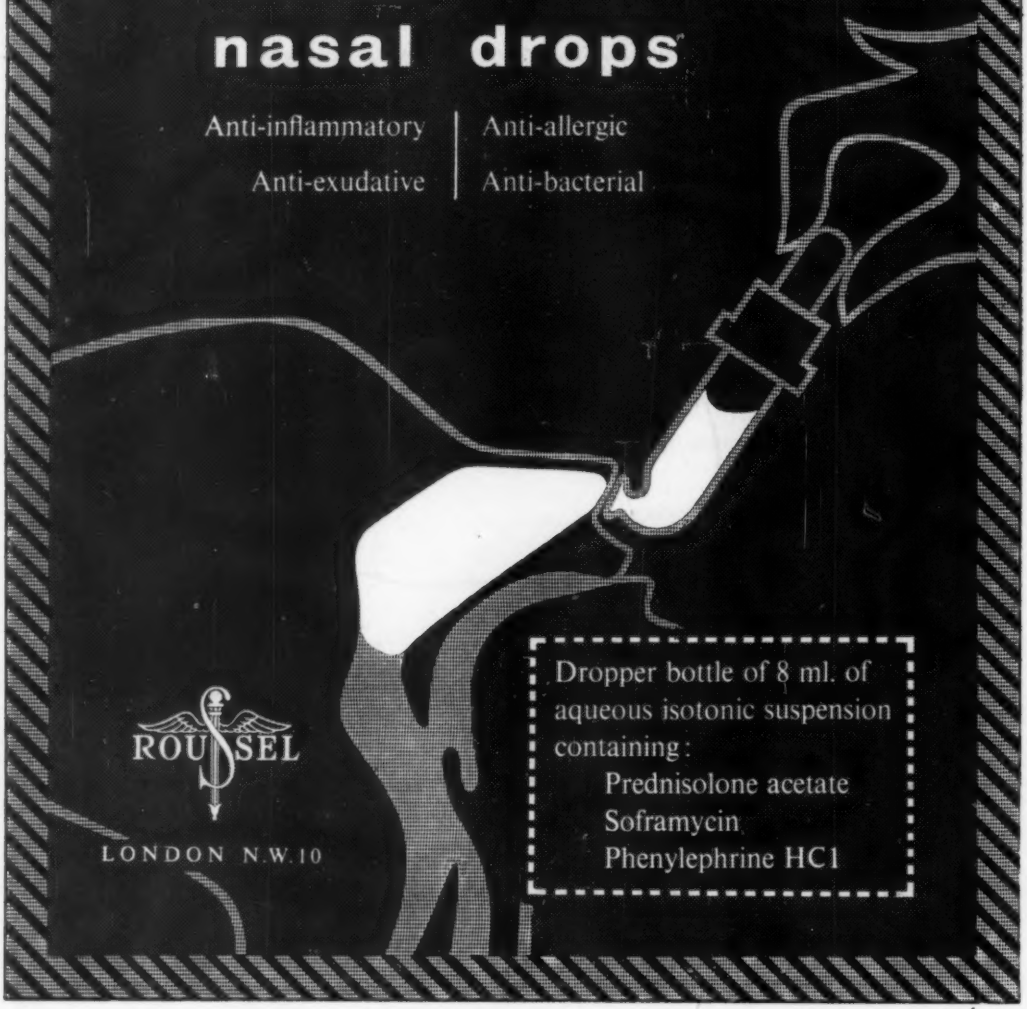

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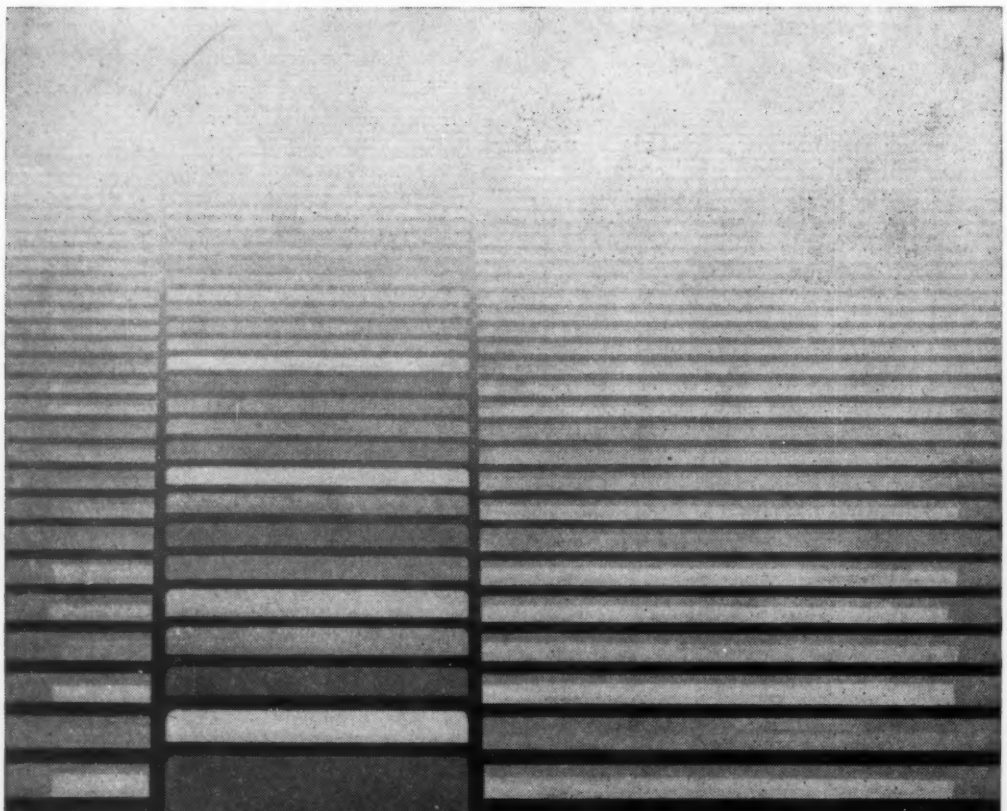

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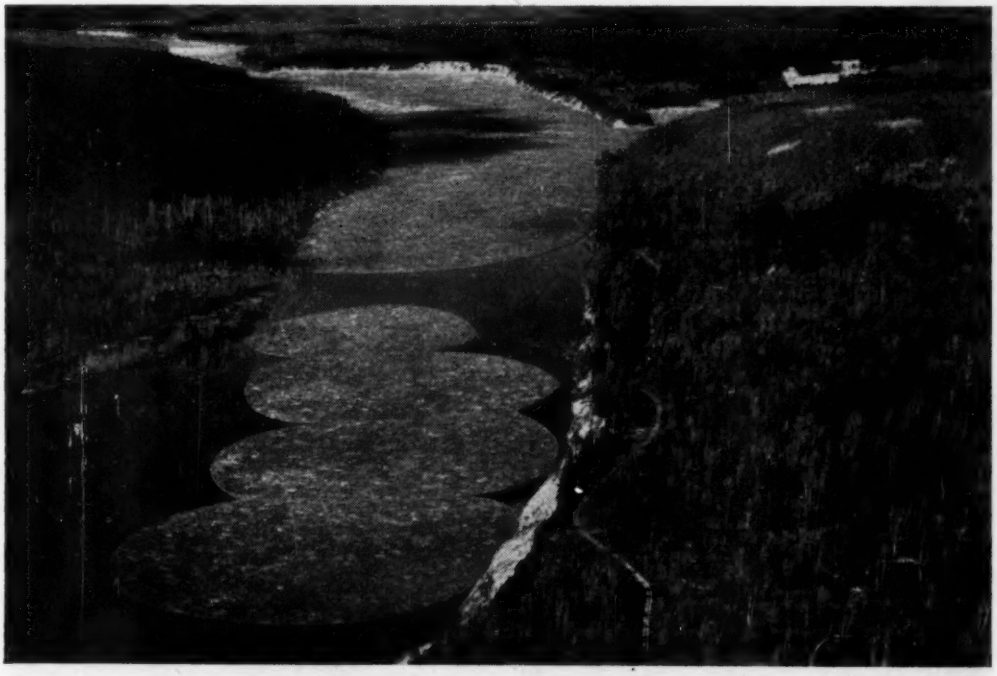

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2. PHILADELPHIA MEDICINE, 50:671, 673, 1955.
3. JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, 157:311-318, 1955.
4. SCIENCE, 121:176, 1955.
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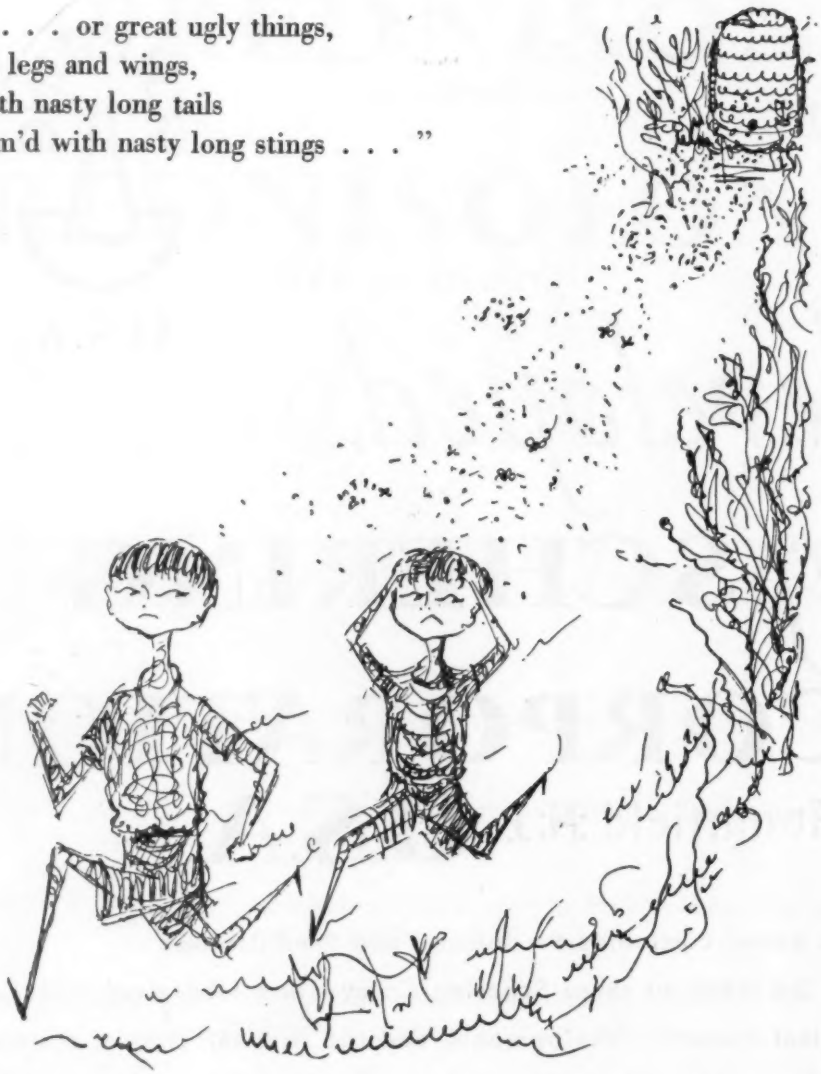

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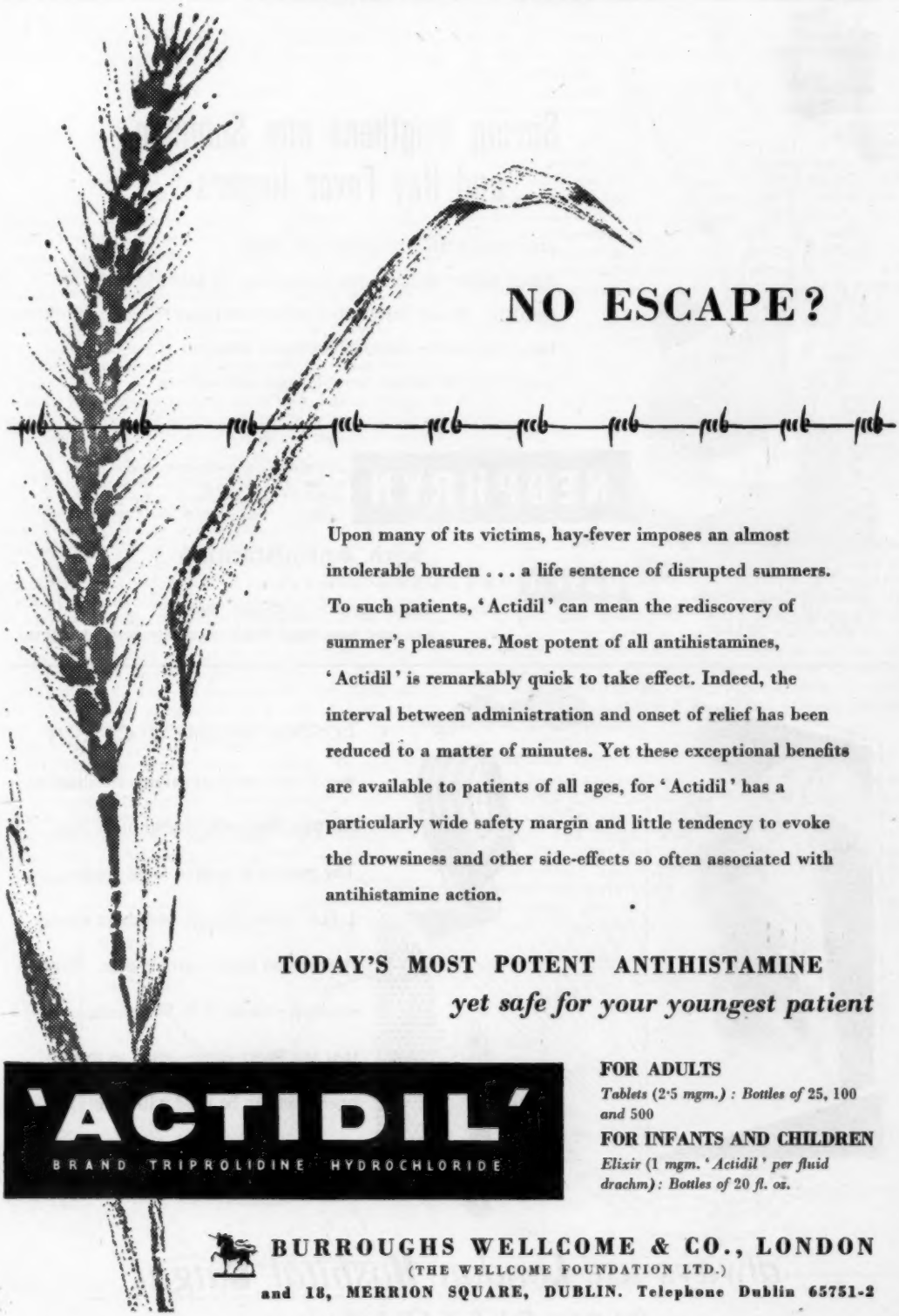

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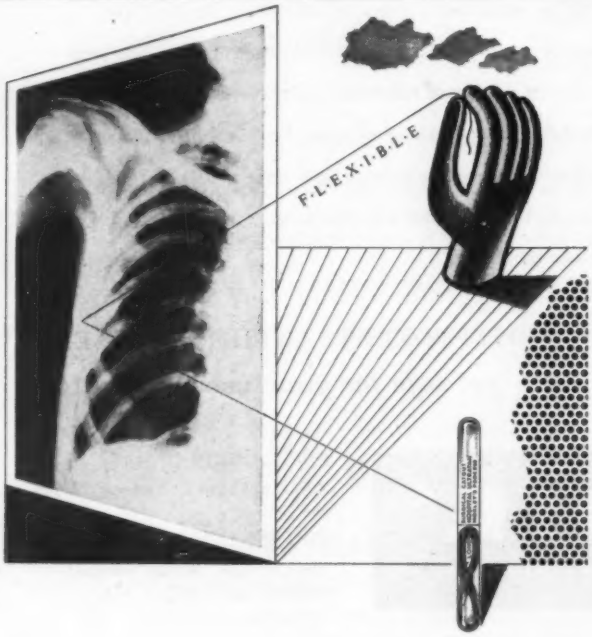

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THE EFFECT ON SERUM-CHOLESTEROL OF DIETS CONTAINING DIFFERENT FATS

HAQVIN MALMROS
M.D. Lund
PROFESSOR OF MEDICINE, UNIVERSITY OF LUND, SWEDEN

GERHARD WIGAND
M.B. Lund
RESEARCH ASSISTANT

THE effect on serum-cholesterol of diets containing different fats has been the subject of many investigations in recent years. Those of Kinsell et al. (1952, 1953a and b, 1954a and b, 1955), Groen et al. (1952), Cochrane et al. (1953), Ahrens et al. (1954, 1955, 1957), Beveridge et al. (1955, 1956), Friskey et al. (1955), Malmros and Wigand (1955), and Bronte-Stewart et al. (1956), for example, have shown that certain fats raise the blood-cholesterol level, while others, such as corn oil, depress it.

Most of these investigations have been based on short-term experiments, and sometimes the tests were made on only a few subjects. In some series the results were less reliable because of the use of more than one kind of fat at a time. In many the authors used a formula diet to avoid variation in food intake. But such a diet can hardly be regarded as physiological. At any rate, it cannot be used for any length of time in the patients at home, and still less as a normal diet for healthy people.

In a leading article in this journal (April 28, 1956) emphasis was laid on the need to preserve the unsaturated fatty acids in vegetable oils and to make these oils palatable and acceptable to whole populations, if we want to change people's eating habits. The article also pointed out how important it was to determine whether a fall in serum-cholesterol by the incorporation of certain vegetable oils in the diet can be maintained over a long period.

We are now able to present the results of some experiments which were started two years ago and may help to answer some of these questions.

With the help of technical experts, we succeeded in producing, from corn oil and other vegetable fats, without altering the composition of the fats, palatable products resembling milk, different sorts of cheese, and ice cream. The "milk" was produced as a powder with good keeping-qualities.* These foodstuffs were used in our experiments on healthy subjects as well as in the treatment of patients with hypercholesterolæmia.

* Manufactured by A. B. Mazetti, Malmö, Sweden.

The basic diet used consisted of bread, cereals, vegetables, potatoes, rice, fruit, and sugar. To this fat-free basic diet we added various fats to be tested, usually in an amount corresponding to about 40% of the calories.

In the investigation of corn oil, for example, we used the oil partly in the preparation of the food (e.g., added to mashed potatoes or porridge, or as salad-dressing or mayonnaise or for frying), and partly in the form of the above-mentioned artificial dairy products. The latter contained sufficient milk protein (derived from real milk) to cover the protein requirements. The "milk" powder was used partly for the preparation of food and partly dissolved in cold water in a quantity corresponding to about 50 g. fat per litre. Of this 5% artificial milk, the subjects consumed on the average three-quarters to one litre per day. They also received vitamins A and D in adequate quantities. With these foodstuffs it is fairly easy to compose a diet both palatable and sufficiently variable for most patients to adhere to for months or years. As was apparent from experiments described below, the diet might in some cases also include a certain amount of lean meat or fish without increasing the serum-cholesterol.

TABLE I—CHARACTERISTICS OF DIFFERENT FATS TESTED IN EXPERIMENTS I—XII

Fat	Melting-point (°C)	Iodine number
Corn oil		117
Hydrogenated cocoanut oil	33	5·2
Coconut oil		9
Olive oil		86
Rape-seed oil		102
Safflower-seed oil		143
Hydrogenated whale oil	28·5	83
Whale oil		118

Dietary Experiments with Normal Volunteers

The experiments were carried out in the University Hospital at Lund, where the food was prepared under the supervision of a dietitian. Three meals (breakfast, luncheon, and dinner) were served in a special dining-room. The volunteers—all healthy people, members of the Red Cross, hospital attendants, or medical students—carried on with their usual work throughout the experimental period. Their ages ranged from 18 to 61 years. They were asked to take enough of the experi-

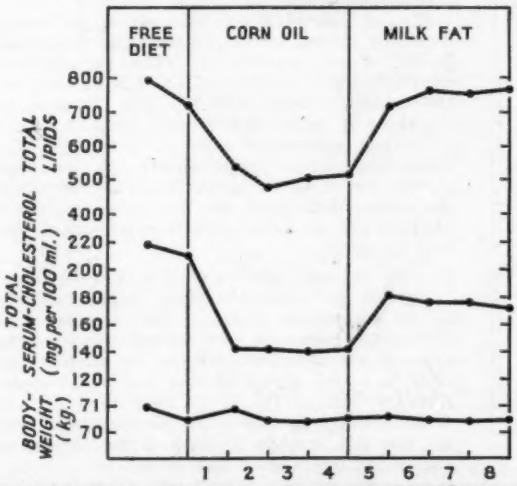

Fig. 1—Experiment I. Group average for serum total lipids and total cholesterol and body-weight of 12 healthy volunteers. First period: corn oil. Second period: milk fat.

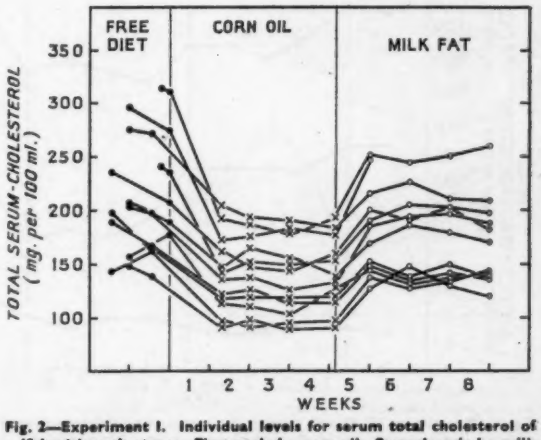

Fig. 2—Experiment I. Individual levels for serum total cholesterol of 12 healthy volunteers. First period: corn oil. Second period: milk fat.

mental diets to keep their body-weights as constant as possible. Samples of blood were withdrawn once or twice a week and analysed in duplicate for serum total-cholesterol by the method of Abell et al. (1952), as modified by Anderson and Keys (1956). The chemical characteristics of the fats used are shown in table I.

I. Corn Oil versus Milk Fat

When ordinary free-choice diet was replaced by an experimental diet containing 40% of the calories in the form of corn oil, but no other fat, the serum-cholesterol fell promptly by about 70 mg. per 100 ml. (figs. 1 and 2). The cholesterol levels remained low during the four weeks the experiment lasted. When corn oil was afterwards replaced by an equivalent amount of milk fat, the serum-cholesterol again increased but did not quite reach its original level.

It might be objected that this decrease while the subjects were on corn oil might be simply due to the fact that the diet contained no cholesterol. To check this possibility, we carried out the following experiment.

II. Milk Fat versus Corn Oil and Cholesterol

During the milk-fat period the serum-cholesterol persisted at roughly the same levels as before the experiment. When the milk fat was replaced by corn oil, the serum-cholesterol decreased and remained low, even when the subjects received 0·5 g. cholesterol per day for three weeks (fig. 3). This amount is at least equal to that which the subjects received during the previous period when they were on milk fat. Hence the absence of cholesterol in corn oil cannot explain the effect of this oil on the serum-cholesterol level.

III. Hydrogenated Coconut Oil versus Corn Oil

Fig. 4 shows that the serum-cholesterol persisted at its original levels during the four weeks in which the subjects received hydrogenated coconut oil as 40% of their calories. Replacement of the coconut oil by the equivalent amount of corn oil produced a prompt fall in the serum-cholesterol.

This experiment demonstrates that corn oil contains some substance which lowers the serum-cholesterol level. One might be tempted to ascribe this depressing effect to vitamin E, which is found in fairly high concentrations in corn oil. This possibility can be ruled out, however, because the subjects received a supplement of tocopherol 200 mg. per day while they were on the coconut-oil diet.

But there are also other and more important differences between corn oil and coconut oil. Corn oil contains about 57% of linoleic acid, while coconut oil contains only 1% (table II). In addition, the small amount of linoleic acid in the coconut oil is probably destroyed by hydrogenation. Thus it is possible that the favourable effect of corn-oil fat on the serum-cholesterol level is due to its large content of linoleic acid.

In a preliminary experiment, pure ethyl esters of linoleic acid † were given to a patient with hypercholesterolæmia for four weeks in a quantity of 25 g. per day. They produced an effect similar to that of corn oil—i.e., a definite decrease in the serum-cholesterol. In an experiment with a synthetic triglyceride containing 2% linoleic acid, Kinsell et al. (1956) noted a definite fall in the serum-cholesterol level. The twenty-four-hour linoleic-acid intake in this case was about 2 g.—an astonishingly small amount.

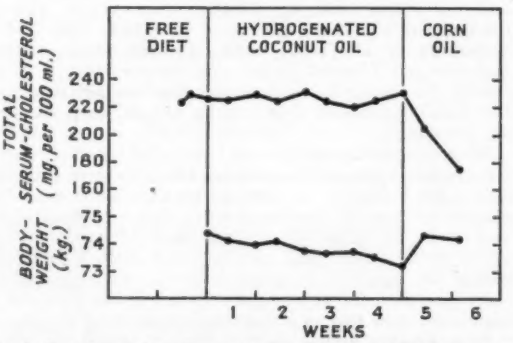

Fig. 4—Experiment III. Group average for serum total cholesterol and body-weight of 8 healthy volunteers. First period: hydrogenated coconut oil. Second period: corn oil.

For technical reasons it is difficult to carry out many experiments of this kind with synthetic fatty-acid glycerides or other fatty-acid esters. We therefore endeavoured first to find out by trial and error how much corn oil is needed to decrease the serum-cholesterol.

IV. Two-thirds Coconut Oil (Hydrogenated) and one-third Corn Oil

Fig. 5 shows that the serum-cholesterol remained almost unchanged throughout the first period of the experiment, when the subjects received only hydrogenated coconut oil (40% of the calories = about 135–150 g.). As soon as one-third of the coconut oil was replaced by the equivalent amount of corn oil (45–50 g.), the serum-cholesterol began slowly to decrease. During the three weeks the experiments lasted, the serum-cholesterol did not, however, reach levels as low as those noted in experiments with corn oil alone.

V. Free Diet with Addition of 50 g. Corn Oil

Further to investigate what amount of corn oil is needed to maintain the depression in the serum-cholesterol level following some of the experiments described earlier, we allowed the subjects a free choice of diet, but with supplementary corn-oil fat 50 g. daily as 1 litre of artificial milk. In most cases this amount of corn oil was not enough to keep down the serum-cholesterol level (figs. 6 and 7).

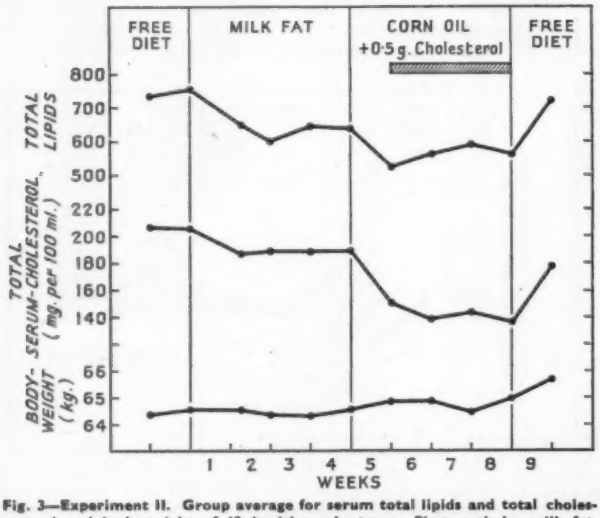

Fig. 3—Experiment II. Group average for serum total lipids and total cholesterol and body-weight of 12 healthy volunteers. First period: milk fat. Second period: corn oil, with the addition of an equivalent amount of cholesterol (0·5 g.).

† Prepared by Prof. Ralph T. Holman at the Hormel Institute, University of Minnesota, Austin, U.S.A.

TABLE II—COMPOSITION OF SOME COMMON FATS (DEUEL 1951, ECKEY 1954, HILDITCH 1956)

Fat	Saturated											Unsaturated				
	C_4	C_6	C_8	C_{10}	C_{12}	C_{14}	C_{16}	C_{18}	C_{20}	C_{22}	C_{24}	Oleic	Linoleic	Linolenic	Erucic	C_{16-18}
Cows milk	4	1	1	1	3	8	23	12	1			37	6			1
Human milk					6	7	22	9	1			39	10			3
Lard							27	14				50	6			2
Cocos			8	10	45	18	8	4				6	1			
Olive oil							6	4				83	7			
Rape-seed oil						2		1		1	3	17	15	10	51	
Linseed oil							7	6				15	15	57		
Ground-nut oil							6	5	3	3	1	56	26			
Cotton-seed							20	2				35	42			
Soybean oil							10	2	1			29	51	6		
Corn oil							10	3				30	57			
Sunflower-seed oil							4	3				34	59			
Poppy-seed oil							8	3				16	73			
Safflower-seed oil							5	7	1			8	79			

Since about half the fatty acid in corn oil is linoleic acid, the necessary amount of linoleic acid must be at least about 25 g. a day (if linoleic acid is in fact the active component of corn oil). The results of these investigations agreed well with the findings of Beveridge et al.

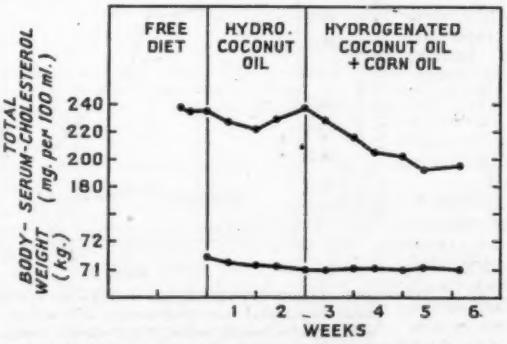

Fig. 5—Experiment IV. Group average of serum total cholesterol and body-weight of 8 healthy volunteers. First period: hydrogenated coconut oil. Second period: two-thirds of the fat as hydrogenated coconut oil, one-third as corn oil.

(1956), who reported that the serum-cholesterol decreased when the subjects received 30% of the calorie intake in the form of corn oil and 30% in the form of butter. When, however, their subjects received only 15% of calories as corn oil and 45% as butter, the serum-cholesterol level rose.

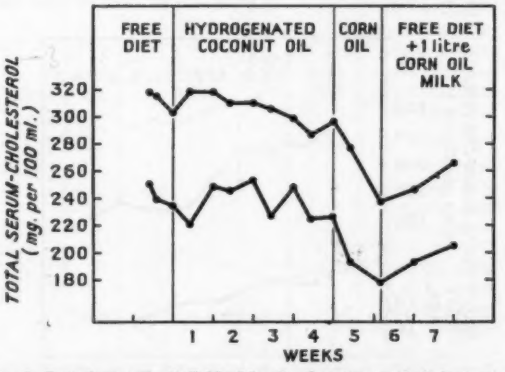

Fig. 6—Experiment V. Individual levels of serum total cholesterol of 2 healthy volunteers. First period: hydrogenated coconut oil. Second period: corn oil. Third period: free diet with addition of 1 litre corn-oil "milk" (50 g. corn oil).

VI. Corn-oil Diet with Addition of 100 g. Lean Meat

When hydrogenated coconut oil was replaced by corn oil, a definite decrease was noted in the serum-cholesterol (fig. 8) as in earlier experiments. Later, when the diet was extended to include 100 g. of lean meat, the serum-cholesterol persisted at a low level as long as the experiment lasted.

These experiments on healthy volunteers, and similar investigations in other parts of the world, have shown that corn oil contains some substance which can produce and maintain depression of the serum-cholesterol level. Some observations suggest that the active component may be linoleic acid. It is, however, possible that other unsaturated fatty acids have a similar effect on the serum-cholesterol.

Oleic acid is found in all ordinary fats, sometimes in very high concentration. Thus more than 80% of the fatty acid in olive oil is oleic acid. It has not yet been established whether this fatty acid, which is not regarded as belonging to the essential fatty acids, has a favourable effect on the blood-cholesterol level. Since olive oil contains only about 7% linoleic acid, but more than 80% oleic acid, it can hardly be expected to depress the cholesterol level, unless the oleic acid is also active. Some of the short-term experiments of Bronte-Stewart et al. (1956), however, suggest that olive oil is capable of reducing the cholesterol level. To investigate this possibility we made further experiments.

VII. Olive Oil versus Hydrogenated Coconut Oil and Corn Oil

Having found in earler experiments that corn oil depresses the blood-cholesterol level and that hydrogen-

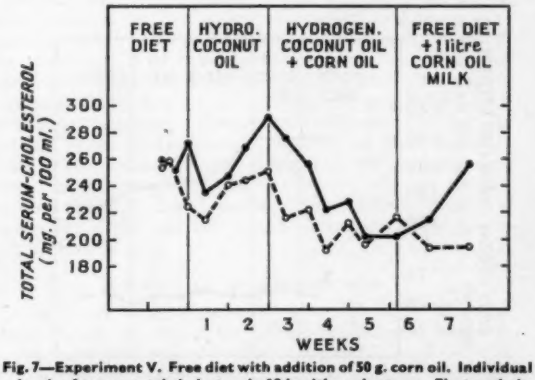

Fig. 7—Experiment V. Free diet with addition of 50 g. corn oil. Individual levels of serum total cholesterol of 2 healthy volunteers. First period: hydrogenated coconut oil. Second period: two-thirds hydrogenated coconut oil, plus one-third corn oil. Third period: free diet with addition of 1 litre corn-oil "milk" (50 g. corn oil).

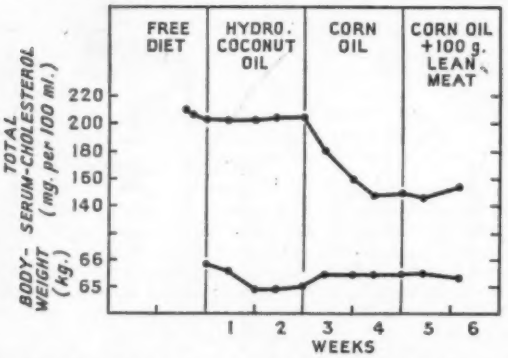

Fig. 8—Experiment VI. Corn oil with addition of 100 g. lean meat. Group average for serum total cholesterol and body-weight of 8 healthy volunteers. First period: hydrogenated coconut oil. Second period: corn oil. Third period: corn oil with addition of 100 g. lean meat.

ated coconut oil does not, we used these oils as references in later experiments. In experiment VII the subjects received hydrogenated coconut oil for the first week. During this time no change was noted in the cholesterol level (fig. 9). When hydrogenated coconut oil was replaced by an equivalent amount of olive oil, the cholesterol levels decreased to become stable at a level of about 35 mg. per 100 ml. below the starting value. During the third experimental period the subjects received corn oil, which produced a further slight decrease in the serum-cholesterol.

Thus, as in Bronte-Stewart et al.'s experiments, olive oil depressed the blood-cholesterol. But the effect seems to be less than that obtainable with corn oil. Considering its relatively small linoleic-acid content, olive oil has a substantial cholesterol-depressing action, which might possibly be ascribed to its high content of oleic acid or some other substance.

About half the fatty acid in rape-seed oil is erucic acid, a C_{22} fatty acid with one double bond. This unsaturated fatty acid is specific to rape-seed oil and mustard oil. It is not known whether it has any favourable effect on the blood-cholesterol. The question is of practical importance, because in some countries rape seed is used in making margarine. Erucic acid is also of theoretic interest, for Wood and Migicovsky (1956) have shown that, like linoleic acid, this unsaturated fatty acid strongly inhibits cholesterol synthesis in the liver.

VIII. Rape-seed Oil versus Hydrogenated Coconut Oil and Corn Oil

As in the previous experiment, a hydrogenated coconut-oil diet produced no decrease in the serum-cholesterol (fig. 10). As soon as the coconut oil was replaced by rape-seed oil, the serum-cholesterol began to fall, and after about a week the mean level had become steady at about 40 mg. per 100 ml. below the original level. In some cases the cholesterol later showed a tendency to rise. When, after about two and a half weeks, the rape-seed oil was replaced by corn oil, the cholesterol decreased further.

Thus rape-seed oil, too, depresses the serum-cholesterol. The experiments permit no conclusion as to whether this effect should be ascribed entirely to linoleic acid, which represents about 15% of the fatty acids in rape-seed oil, or also to other unsaturated fatty acids. The other fatty acids in rape-seed oil include 50% erucic acid, 10% linolenic acid, and 17% oleic acid.

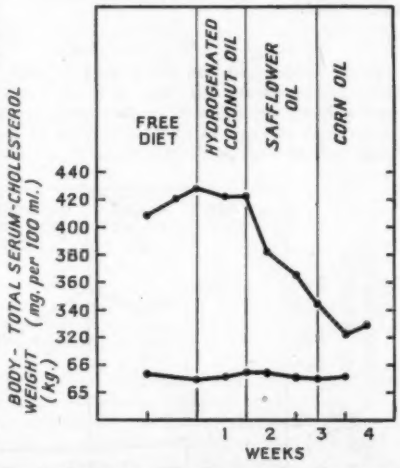

Fig. 11—Experiment IX. Group average for serum total cholesterol and body-weight of 3 patients with hypercholesterolæmia. First period: hydrogenated coconut oil. Second period: safflower-seed oil. Third period: corn oil.

Safflower-seed oil contains more linoleic acid than any other vegetable or animal fat (table II). If linoleic acid were the only active factor, one might expect this oil to have a striking effect on the cholesterol level.

IX. Safflower-seed Oil versus Hydrogenated Coconut Oil and Corn Oil

These experiments are not strictly comparable with the others. Because only a little safflower-seed oil was available the experiment was limited to 3 subjects. To obtain as clear an effect as possible, we carried out the

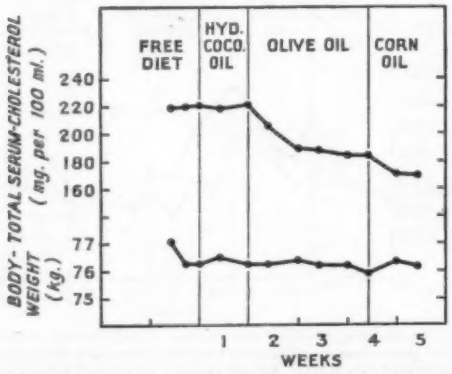

Fig. 9—Experiment VII. Group average for serum total cholesterol and body-weight of 11 healthy volunteers. First period: hydrogenated coconut oil. Second period: olive oil. Third period: corn oil

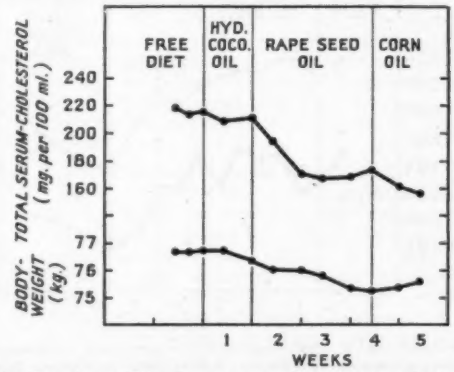

Fig. 10—Experiment VIII. Group average for serum total cholesterol and body-weight of 11 healthy volunteers. First period: hydrogenated coconut oil. Second period: rape-seed oil. Third period: corn oil.

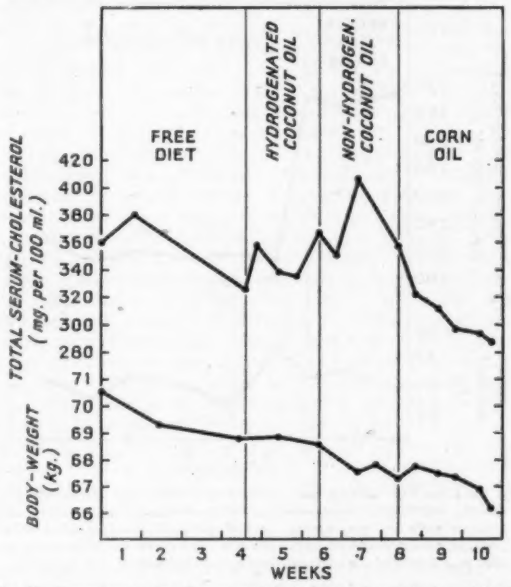

Fig. 12—Experiment X. Serum total cholesterol and body-weight in a case of hypercholesterolæmia. First period: hydrogenated coconut oil. Second period: non-hydrogenated coconut oil. Third period: corn oil.

studies not on normal subjects but on patients with hypercholesterolæmia.

When hydrogenated coconut oil was replaced by an equivalent amount of safflower-seed oil, the serum-cholesterol promptly fell (about 75 mg. per 100 ml.) (fig. 11). Ten days later, when the patients were given corn oil, the serum-cholesterol decreased further. Thus safflower-seed oil, as well as corn oil, has a striking cholesterol-depressing effect.

In our earlier experiments we used hydrogenated coconut oil for comparison and obtained no decrease in the serum-cholesterol with that fat. This was probably because coconut oil contains only a minute amount of linoleic acid, and because the double bonds of the unsaturated linoleic acid are broken down during the hardening process. But since the hydrogenation procedure might also influence the fat in some other way, it was thought desirable to study the effect of non-hydrogenated coconut fat in the serum-cholesterol.

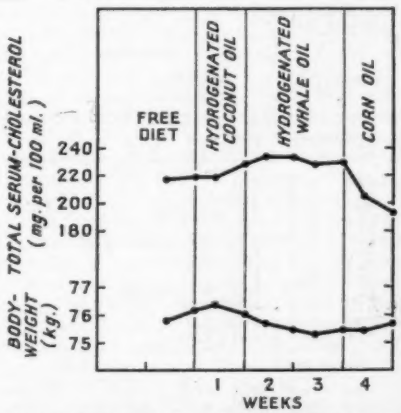

Fig. 13.—Experiment XI. Group average for serum total cholesterol and body-weight of 12 healthy volunteers. First period: hydrogenated coconut oil. Second period: hydrogenated whale oil. Third period: corn oil.

X. Non-hydrogenated Coconut Oil versus Hydrogenated Coconut Oil and Corn Oil

We compared these fats in only one case—a patient with hypercholesterolæmia (fig. 12). The serum-cholesterol remained high no matter whether the coconut oil was hydrogenated or not. But, as soon as the coconut oil was replaced by corn oil, the serum-cholesterol decreased.

It is thus evident that non-hydrogenated coconut oil like the hydrogenated oil has no cholesterol-depressing effect. This supports the assumption that the decrease obtained with corn oil is probably ascribable to its linoleic-acid content.

Some marine oils are very rich in highly unsaturated fatty acids. Bronte-Stewart et al. have shown that pilchard oil depresses the serum-cholesterol. This oil is said to contain about 18% arachidonic acid, as well as about 12% linoleic acid (C_{18}-4H). The depressing effect on the cholesterol might therefore be explained by the linoleic-acid content alone, which is somewhat larger than that of olive oil. Whale oil also contains relatively large amounts of highly unsaturated fatty acids, including about 11% arachidonic acid, but (as far as is known) no linoleic acid. We therefore tried the effect of whale oil, hydrogenated as well as non-hydrogenated.

XI. Hydrogenated Whale Oil versus Hydrogenated Coconut Oil and Corn Oil

As long as the patients were on hydrogenated coconut oil, the serum-cholesterol remained high. When this oil was replaced by hydrogenated whale oil, the cholesterol showed no tendency to decrease. As soon as corn oil was used, the cholesterol level dropped (fig. 13).

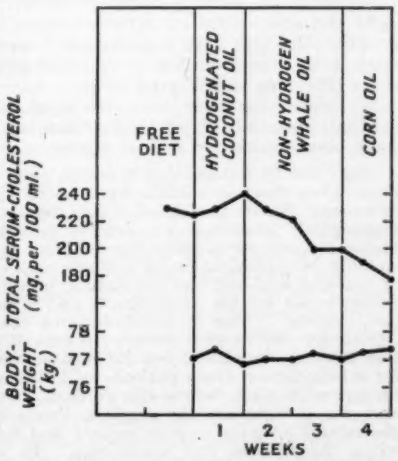

Fig. 14—Experiment XII. Group average for serum total cholesterol and body-weight of 9 healthy volunteers. First period: hydrogenated coconut oil. Second period: non-hydrogenated whale oil. Third period: corn oil.

XII. Non-hydrogenated Whale Oil versus Hydrogenated Coconut Oil and Corn Oil

Refined non-hydrogenated whale oil becomes rancid almost as soon as the package is opened and has a disagreeable smell. Of our 12 volunteers, 3 could not stand this smell and 2 of the 3 got diarrhœa: in these the experiment was therefore stopped. The remaining 9 consumed the entire fat ration without any consequent intestinal disorders. The serum-cholesterol tended to decrease when hydrogenated coconut oil was replaced by non-hydrogenated whale oil (fig. 14). Two weeks later, when the subjects were placed on corn oil, the serum-cholesterol dropped still more. Thus, whale oil has a depressing effect on the blood-cholesterol despite its lack of linoleic acid.

DISCUSSION OF EXPERIMENTS

It is clear from these twelve experiments that, as regards their effect on the serum-cholesterol, there is no essential difference between vegetable and animal fat. Most of the vegetable oils studied (corn oil, olive oil, rape-seed oil, and safflower-seed oil) depress the blood-cholesterol level, but coconut oil does not. Milk fat raises the serum-cholesterol but whale oil depresses it

Thus the action does not depend entirely on whether the fat is of animal or vegetable origin. Our results, however, do seem to show that the cholesterol-depressing effect of some oils has something to do with the unsaturated fatty acids found in them in varying quantity. Milk fat and coconut fat contain only small amounts of linoleic acid, and both of them tend to raise the cholesterol level. It is true that whale oil, which depresses the cholesterol level, does not contain any linoleic acid, but it does contain arachidonic acid, which is also regarded as an essential fatty acid. Judging by our experiments and those of Keys et al. (1957a and b), the decrease in the serum-cholesterol is not directly proportional to the essential-fatty-acid content of the fat used. The mode of action of oleic acid is still obscure. Investigation of the effect of different fatty acids on the blood-cholesterol thus requires further experiments with the use of pure fatty-acids esters. Such experiments are in progress at our laboratories.

Clinical Studies

TREATMENT OF ESSENTIAL HYPERCHOLESTEROLÆMIA WITH A CORN-OIL DIET

At the symposium on arteriosclerosis in Minneapolis in 1955, Malmros gave a preliminary report on clinical trials with a corn-oil diet in essential hypercholesterolæmia (Malmros and Wigand 1955).

We have now used this treatment in 19 cases of familial essential hypercholesterolæmia, 14 of which have been treated for at least a year.

There are 10 females and 9 males, aged 7 to 66 years. Most have reached middle age, 15 of them being 40 or more. In 10 the disease was discovered following myocardial infarction or angina pectoris. In the remainder, hypercholesterolæmia was as a rule discovered on examination of siblings and other relatives of patients who had had myocardial infarction. 7 of the patients had tendon xanthomata and 5 xanthelasma on the eyelids. The blood-cholesterol was determined repeatedly before any dietary treatment with corn oil was started. In most cases the disease had been known for a long time; these patients had then as a rule been on a low-fat diet before the corn-oil diet was started and for this reason the starting levels of the serum-cholesterol were not so high as they had been at the time when the disease was discovered. In those patients who had had myocardial infarction, dietary treatment with corn oil was not started during the acute stage, but some weeks or months later. Anticoagulant therapy was not given as long as the patients were on the experimental diet.

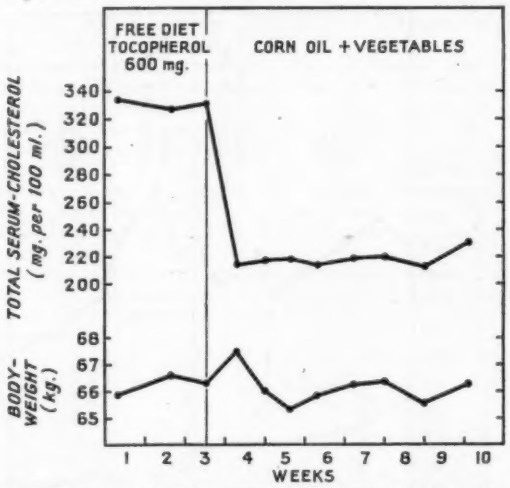

Fig. 15—Case 18. He had had a myocardial infarction 18 months previously, and hypercholesterolæmia had then been found. He had been treated with various agents, including large doses of tocopherol, without effect on the cholesterolæmia. But when the milk-fat in the diet was replaced by corn oil the serum-cholesterol fell abruptly.

In most cases the diet was started when the patients were admitted to the department of medicine of the University Hospital in Lund, and was continued afterwards. 2 were treated only as outpatients. Every patient had a check examination of the serum-cholesterol and body-weight at least once a month. Blood was drawn with the subject fasting. Serum-cholesterol was estimated in duplicate. Every time the patients came to the outpatient department, they received a certain amount of corn oil and the various dairy products made from corn oil. In this way it was possible to

TABLE III—19 CASES OF FAMILIAL HYPERCHOLESTEROLÆMIA (F.H.) TREATED WITH CORN-OIL DIET; CASES 1–14 FOR A YEAR AND CASES 15–19 FOR 3 MONTHS. A.P. = ANGINA PECTORIS, M.I. = PREVIOUS MYOCARDIAL INFARCTION, T.X. = TENDON XANTHOMATA

Case no.	Sex	Age	Serum-cholesterol								Change in serum-cholesterol		Body-weight (kg.)		Diagnosis
			Before corn oil	After 2 wks' treatment	After 1 mo.	After 2 mos.	After 3 mos.	After 6 mos.	After 9 mos.	After 1 year	(Mg. per 100 ml.)	%	Before	After 1 year	
											After a year				
1	M	46	472	338	355	365	336	327	362	283	−189	−40	61·8	56·0	F.H., M.I., T.X.
2	F	66	545	..	447	414	387	420	380	395	−150	−28	49·0	51·8	F.H., A.P., T.X., cholelithiasis, diabetes mellitus
3	F	55	364	279	250	282	272	277	258	287	− 77	−21	61·3	56·2	F.H.
4	F	58	440	300	296	259	346	338	340	309	−131	−30	55·7	50·1	F.H., M.I.
5	F	46	398	306	274	313	275	337	269	303	− 95	−26	79·2	68·0	F.H., obesity
6	F	48	351	272	275	199	253	237	273	241	−109	−31	69·0	67·0	F.H.
7	M	59	482	399	346	445	456	423	417	414	− 68	−14	65·0	65·2	F.H., M.I., peptic ulcer
8	F	55	340	319	292	289	306	304	300	316	− 24	− 7	69·7	66·8	F.H., M.I.
9	F	44	566	463	414	414	440	367	388	435	−131	−23	53·0	55·5	F.H., T.X.
10	M	35	460	437	393	385	407	406	412	365	− 95	−20	72·2	69·9	F.H.
11	M	65	490	408	367	450	403	370	392	357	−133	−27	90·5	84·5	F.H., M.I., obesity
12	F	42	427	346	313	290	310	287	331	323	−104	−24	53·5	54·3	F.H., A.P.
13	F	47	507	425	424	457	402	431	402	352	−155	−30	66·0	60·8	F.H., A.P.
14	F	42	366	321	327	273	287	294	349*	621†	+255	+70	47·0	45·2	F.H., T.X.
											After 3 mos.		After 3 mos.		
15	M	33	489	339	325	300	299	..	..	..	−190	−35	73·4	74·4	F.H., †T.X.
16	M	57	491	352	339	356	356	..	..	..	−135	−27	62·0	63·1	F.H., A.P., T.X.
17	M	7	371	292	278	266	247	..	..	..	−124	−33	20·0	21·6	F.H.
18	M	55	333	213	216	217	218	..	..	..	−115	−34	66·2	66·1	F.H., M.I.
19	M	39	435	378	393	421	457	..	..	..	+ 3	+0·6	82·4	81·0	F.H., T.X., sciatica

* Exceeding the prescribed diet. † On free diet.

estimate the amount of corn-oil fat the patients had consumed. Most of them have strictly observed the dietary prescriptions, but a few have been less careful. One of them even went over to a free diet, and later estimation of the serum-cholesterol showed that it had increased considerably (case 14, table III).

When we started our trials in 1955, the patients followed a fairly strict diet. They were allowed only a basal diet consisting of bread, cereals, vegetables, potatoes, rice, spaghetti, fruit, and sugar, in addition to a small amount of pure corn oil and the dairy products prepared from corn oil. They thus covered the calorie requirements mainly with carbohydrates, and only to a minor extent with fat. But on this diet some lost weight. We then increased the amount of corn oil, so that 40% of the calorie requirements was satisfied with vegetable fat, and in several cases we also allowed the patient to consume lean meat (100–150 g. daily) or fish. On this diet they could maintain their weight without difficulty. This inclusion of meat and fish in the diet apparently had no unfavourable influence. During treatment all the patients received a supplement of 6000 I.U. of vitamin A and 800 I.U. of vitamin D per day. All tolerated the diet well, and none have had diarrhœa or other disorders of the digestive tract.

The cholesterol levels in all the patients examined had already decreased after two weeks' treatment (table III). During further treatment, the serum-cholesterol decreased still more or remained at a fairly low level in some cases; in others it tended to increase. After a year's treatment, the cholesterol levels were lower than the original in all but the case in which the patient had begun to be less careful about the diet. Among the patients observed for only a short time was one (case 19, table III) who appeared to be almost refractory to the treatment: after about six months' treatment the cholesterol level was just as high as before, though he had apparently strictly observed the dietary prescriptions. The decrease in cholesterol level was moderate in some cases but in others it was so pronounced that the level was, practically speaking, normal.

COMMENT

It is somewhat surprising that the serum-cholesterol can be lowered (even in essential hypercholesterolæmia) by the use of a diet, including certain fats, composed mainly of unsaturated fatty acids. This disease, which may be regarded as an inborn error of metabolism, has proved refractory or very resistant to earlier types of therapy. The disease is of practical importance because, as is well known, these patients often develop myocardial infarction or other symptoms of early atheromatosis of the coronary arteries.

It is, of course, still too early to decide whether the corn-oil diet of the type we used can prevent the development of coronary atheroma in such cases, and still less whether it can lead to the regression of any existing atheroma. Of our 19 patients with familial hypercholesterolæmia, none have died during the treatment. Some of the patients still have attacks of angina pectoris on physical exertion. As yet the tendon xanthomata have not shown any definite tendency to disappear.

In myocardial infarction, a somewhat increased serum-cholesterol is not uncommon, even if the patient does not belong to a family with essential hypercholesterolæmia. In such cases it is often possible to reduce the serum-cholesterol level simply by decreasing the amount of dietary fat. This is justified, particularly in patients who have had a very high consumption of fat. Both in these cases and in those with a relatively moderate consumption of fat it might be useful to replace milk fat and other animal fat by corn oil. This, as we have often seen, produces a sharp drop in the serum-cholesterol within a week, and the serum-cholesterol will as a rule remain below its previous level as long as the patient is on a corn-oil diet (fig. 15). Now that we have the opportunity of administering fat with a cholesterol-depressing effect in a palatable form, it is no longer difficult for patients to follow this diet indefinitely if it is thought to be indicated.

Summary

The effect on serum-cholesterol of diets containing various fats was studied in experiments on healthy subjects. Each subject received the various fats in a quantity of about 150 g. per day, supplying about 40% of the calories. Of the vegetable fats, corn oil and safflower-seed oil had a markedly depressing effect on the serum-cholesterol, rape-seed oil a moderate effect, and olive oil a slight effect. Coconut fat (hydrogenated and non-hydrogenated) has had no such effect. Of the animal fats studied, milk fat was found to have an enhancing effect on the cholesterol level. Whale oil was found to depress the level; but this fat can hardly be used for human consumption in non-hydrogenated form, and if it is hydrogenated it loses its cholesterol-depressing effect.

The experiments suggested that the cholesterol-depressing effect of certain fats is related to their content of polyunsaturated fatty acids. Investigation of this possibility requires further experiments with pure esters of different fatty acids. Such experiments are in progress in our laboratories.

In order to make corn oil and other fats with a cholesterol-depressing effect palatable and acceptable to patients, with the help of technical experts we prepared some artificial dairy products such as "milk," "cheese," and "ice-cream." 19 patients with essential hypercholesterolæmia received pure corn oil and such artificial dairy products made from corn oil, as well as a basic diet consisting of bread, cereals, vegetables, potatoes, rice, fruit, sugar, and (in some cases) lean meat and fish. Of these, 14 were treated with corn-oil diet for more than a year.

The serum-cholesterol regularly fell within two weeks. In many cases the cholesterol then remained at a lower level. In some cases, however, it showed a tendency later to increase, but this could in part be explained by the fact that these patients had not strictly observed the dietary restrictions. One of the patients was almost refractory to the treatment.

Other cases of hypercholesterolæmia, not of familial type, also reacted favourably to treatment with corn oil.

These investigations were undertaken as part of a study of atherosclerosis at the Medical Clinic, University of Lund, supported by the Swedish Medical Research Council. The dietary experiments with various fats were financed by Margarinbolaget A. B., Stockholm. We are indebted to Prof. P. Swartling (Alnarp), Dr. G. Wode (Stockholm), Director S. Harlegård (Malmö), Director W. Jacobsson (Kågeröd), and Director Y. Ohlsson (Malmö) for technical advice concerning the artificial dairy products, and generous supplies of such products. Our thanks are also extended to Miss K. Gustavson, Miss H. Nilsson, Miss I. Kockum, and Miss M. Linell for careful technical assistance, and finally to our volunteers whose loyal and conscientious participation made these experiments possible.

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MACROGLOBULINÆMIA

NICHOLAS H. MARTIN
B.M. Oxfd, M.R.C.P., F.R.I.C.
PROFESSOR OF CHEMICAL PATHOLOGY, UNIVERSITY OF LONDON, AT ST. GEORGE'S HOSPITAL

H. G. CLOSE
M.D. Lond.
CLINICAL PATHOLOGIST, DARTFORD GROUP OF HOSPITALS

From St. George's Hospital and the Lister Institute of Preventive Medicine, London, and the Dartford Hospitals

THE accumulating case-reports of "macroglobulinæmia" are so diverse as to raise doubts whether the demonstration of these large molecules in the circulation is pathognomonic of one syndrome.

In 1944 Waldenström described two patients whose serum was unusually viscous at room-temperature and contained large amounts of γ-globulin. Ultracentrifugal analysis of the sera from these patients demonstrated the presence of a protein having a sedimentation-coefficient of 19–20 Svedberg units (the approximate value for normal γ-globulins is 7 units). The original article does not record the amount of the heavy component present, and the estimate of 1 million for its molecular weight seems to be based on the assumption that the molecule was spherical. As might be expected, the formol-gel test was positive. Marrow biopsy from the patients showed no significant increase in plasma cells. No bone lesions were demonstrable by radiography, and neither patient complained of pain in the bones. Waldenström felt justified in distinguishing the condition from other disease processes.

The clinical picture he outlined was of an old person, usually male, with some years' history of gradually increasing weakness and dyspnœa. The more dramatic features, such as the episodes of hæmorrhage from the mouth, the epistaxes, and the symptoms of Raynaud's disease, have not been a constant feature of subsequent reports (Schaub 1952, Wuhrmann 1952). Objective features were a palpable spleen, a normochromic anæmia, some loss of weight, and a markedly increased erythrocyte-sedimentation rate (E.S.R.). But the feature which Waldenström (1944, 1948) emphasised as essential to the syndrome was the unusual qualitative and quantitative changes in the serum-protein pattern, which he emphasised by calling the syndrome "macroglobulinæmia." Since the first paper, there have been 18 case-reports supported by ultracentrifugal evidence. The majority are of single cases supported by a solitary ultracentrifugal analysis carried out late in the disease. Many give no estimate of the amount of abnormal globulin present.

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Inspection of the scattered reports reveals a diverse clinical pattern and no substantial agreement on the histopathological background. Moreover, the sedimentation-coefficients of the principal macroglobulin identified diverge significantly. Thus, in the third patient examined by Wilde and Hitzelberger (1954), the principal abnormal component had a sedimentation-coefficient of 16, in two cases reported by Mackay et al (1957) the coefficients were 14·9 and 14·2, and in the case recorded by Jim and Steinkamp (1956) the coefficient for the principal component was only 13·9, though there was 5% of a larger component present in the same serum-sample. Kekwick, as early as 1940, showed the presence of macromolecules with sedimentation-coefficients of the order of 14 in the serum of patients with myelomatosis.

It seems desirable—though admittedly arbitrary—to confine our consideration to the group which Waldenström first attempted to outline—i.e., to those patients in whose serum the major component among the macroglobulins has a sedimentation-coefficient greater than 17 (calculated from examination of the serum) and, since it is now generally recognised that normal serum contains macroglobulins, in a concentration greater than 10% by ultracentrifugal analysis.

The four cases here reported fulfil these criteria. Moreover, they have all been under continuous observation by one or both of us.

Electrophoretic analyses were made in the Tiselius apparatus at 0°C at a potential gradient of 6 volts per cm. The specimens were dialysed against phosphate buffer (pH 8·0, I=0·2) and diluted to a protein concentration of 2 g. per 100 ml. buffer before analysis.

For ultracentrifugal analysis, dialysed samples were so diluted that the solution contained phosphate buffer (pH 8·0, I=0·2) in 0·15 M sodium-chloride solution.

The protein content was adjusted to 1 g. per 100 ml. and the solutions subjected to 250,000 *g* in the Svedberg oil-turbine centrifuge.

Details of the analyses in all four patients are shown in table II and fig. 1. Other clinicopathological findings are grouped in table I.

Case-reports

Case 1.—A woman of 61 was observed over the last 15 months of her life. When first seen at the age of 60, she had had "niggling abdominal" pain for 2 years, in bouts lasting 12 hours at intervals of 4 to 5 weeks, and increasing in intensity. These pains had become severe enough to make her vomit.

Clinical and Laboratory Findings.—She was slightly cyanosed. No cardiovascular abnormality or œdema was detected. The spleen was easily palpable and tender, but no lymph-glands were palpable and the liver was not enlarged.

At that time the E.S.R. was 29 mm. (Wintrobe), hæmoglobin 13·5 g. per 100 ml., leucocyte-count 3400 per c.mm. (lymphocytes 1100 per c.mm.), total proteins 7·3 g. per 100 ml. No abnormal serum-globulins were detected by ultracentrifugal analysis and her urine contained no protein.

Course of Illness.—During the next 14 months she had recurrent abdominal pain, and increasing weakness and breathlessness. Her spleen gradually enlarged and the abdominal pain, which was worse when she lay on her left side, seemed to be due to the splenic enlargement. There was no loss of weight.

On her last admission to hospital she was obviously cyanosed, breathless, and weak, and had a perpetual dragging pain in her left side. The spleen now extended into the left hypochondrium, and the lymph-glands in the neck were slightly enlarged. The weakness increased, and she lapsed into coma shortly before death. At no time in the 15 months did she complain of any pain referable to bones or joints, nor was there gross epistaxis or hæmorrhage from mucous membranes.

Necropsy.—The heart was dilated, and the myocardium pale and soft. There was œdema of both lung bases. The spleen was greatly enlarged (1470 g.) and firm, and its capsule was smooth: the cut surface showed white mottling against a pale red background with complete obliteration of the normal malpighian pattern. The liver weighed 2070 g., the surface being curiously mottled though smooth. The cut surface showed the same mottling, the portal tracts appearing thickened and white against the pinkish intervening tissue.

Microscopic Examination of the Spleen.—Sections of the spleen showed complete destruction of the normal splenic tissue by a diffuse overgrowth of pleomorphic cells, among which large histiocytic forms predominated. In addition there were scattered groups of lymphocytes, a few plasma cells and fibroblasts, and a small number of giant-cells with the so-called mirror-image arrangement of the nuclei. There was some laying-down of collagen between the cells, and silver impregnation showed an extensive reticulin network. The general features were those of a rather atypical form of Hodgkin's disease.

Case 2.—A woman of 43 was observed for the last 6 months of her life. When first seen at the age of 43, she said she had never felt really well since the delivery of a stillbirth 3 years before, but in the past 6 months she had felt increasingly tired and breathless on exertion. She had lost her appetite and complained of periodic shivering and sweating attacks at night. She had lost no weight and her periods were normal. 4 months previously she had noticed blurred vision in her left eye.

Clinical and Laboratory Findings.—She was pale, her lips were slightly cyanosed, and there was a small petechial hæmorrhage on the palate. The cardiovascular system was normal; blood-pressure 140/100 mm. Hg. There was no demonstrable œdema. The spleen was just palpable, but no lymph-glands were felt in the neck, axilla, or groin. Small punctate hæmorrhages were seen along the course of the retinal vessels in both eyes.

On admission her hæmoglobin was 8 g. per 100 ml. and her leucocyte-count 4000 per c.mm., including 1320 lymphocytes. Her urine contained Bence Jones protein.

Course of Illness.—4 weeks after admission she had a severe epistaxis for which she required a transfusion. From then until her death 5 months later her course was one of gradually increasing weakness, with repeated hæmorrhage from nose and mouth. She finally lapsed into coma and died.

Marrow biopsy from the sternum and iliac crest showed a moderate increase of plasma cells. Repeated radiography showed no abnormality in the bones, and at no time did she complain of pain referable to the bones or joints.

Necropsy.—There was no evidence of subcutaneous hæmorrhage or jaundice. The myocardium was pale, and there was some œdema of both lung bases. The spleen weighed 350 g.; it was not grossly enlarged and on section the pulp was soft and red. The para-aortic lymph-glands were swollen, soft, and

TABLE I—LABORATORY FINDINGS

Case	Date	Hæmoglobin (g. per 100 ml.)	Leucocytes (total) (cells per c.mm.)	Lymphocytes (total) (cells per c.mm.)	E.S.R. (Westergren*) (mm. in 1st hour)	Serum-protein (g. per 100 ml.)	Albumin (g. per 100 ml.)	Globulin (g. per 100 ml.)	Thymol turbidity (units)	Formol-gel test	Gel at 4°C	Other blood findings	Urinary proteins (including Bence Jones)
1 (died Oct. 18, 1948)	July 17, 1947	13·5	3400	1100	29 (20°C)	7·3	4·1	3·2	5·5	..	..	..	– ve
	Sept. 4, ,,	12·5	3100	..	..	7·04	4·0	3·04	4·5	..	..	Serum-bilirubin 0·3 mg. per 100 ml., blood-urea 26 mg. per 100 ml.	..
	Oct. 16, ,,	12·5	3200	670	29	7·8	..	..	..	..	..	Alkaline phosphatase 10 units	..
	April 22, 1948	12·1	8400	..	..	..	..	..	..	..	..	Blood-urea 21 mg. per 100 ml.	..
	May 14, ,,	..	3900	1480	..	..	..	..	..	..	..	..	..
	July 1, ,,	12·1	4000	1720	14 (20°C)	..	..	..	..	..	..	Serum-bilirubin 0·6 mg. per 100 ml., Wassermann and Kahn ++; bleeding-time normal	– ve
	Sept. 14, ,,	..	..	..	..	8·6	1·4	7·2	19	+	–	..	..
	Sept. 20, ,,	7·05	..	..	..	..	..	..	..	..	..	Alkaline phosphatase 5·4 units	..
	Oct. 6, ,,	8·10	4100	1200	..	..	..	..	..	..	..	..	– ve
	Oct. 12, ,,	6·5	4900	1100	22 (37°C) 2 (20°C) 0 (4°C)	8·9	0·9	8·0	25	+	+	Blood-urea 72 mg. per 100 ml.	Trace, no B.J.
	Oct. 17, ,,	..	..	..	3 (37°C)	9·2	1·0	8·2	..	+	+	..	Trace
2 (died Aug. 10, 1951)	Feb. 8, 1951	8	4000	1320	75 (20°C)	..	..	..	..	..	..	..	++B.J.+
	Feb. 16, ,,	7·8	4200	1640	..	9·9	3·5	..	..	..	..	Rouleaux-formation +; bleeding-time and clotting-time normal	..
	Mar. 28, ,,	8	4000	1840	..	10·7	3·4	6·6	20	+	–	Alkaline phosphatase 3·5 units	B.J.++
	April 19†, ,,	5·5	3000	1350	..	10·8	3·4	7·4	..	..	..	Serum-calcium 9·9 mg. per 100 ml.	B.J.++
	May 8, ,,	7·0	3800	1400	..	..	..	..	..	..	..	..	..
	June 29, ,,	4·8	3000	1300	..	11·7	3·5	8·2	20+	+	–	Wassermann and Kahn +	B.J.+++
	July 23, ,,	4·7	..	..	..	..	..	..	..	..	..	..	..
	Aug. 9, ,,	3·5	..	..	..	11·2	2·9	8·3	..	+	±	Blood-urea 45 mg. per 100 ml.	B.J.+++
3 (died Dec. 14, 1956)	Oct. 11, 1955	10	5000	1850	146	8·0	4·5	§	..	..	..	..	+, no B.J.
	Oct. 17, ,,	10	..	..	..	..	..	..	..	..	..	Rouleaux-formation +	+, no B.J.
	Nov. 21‡, ,,	7·5	..	..	155 (20°C)	8·8	2·6	6·2	25	+	–	Wassermann and Kahn – ve, alkaline phosphatase 3·4 units, blood-urea 45 mg. per 100 ml.	+, no B.J.
	Dec. 3, ,,	10	6000	2200	..	..	..	..	..	..	..	..	+, no B.J.
	Feb. 9, 1956	..	..	..	..	..	..	..	..	..	..	Rouleaux-formation	..
	Feb. 27, ,,	..	..	..	144 (20°C)	..	..	..	..	..	..	Blood-urea 46 mg. per 100 ml.	No B.J.
	Aug. 17, ,,	8	..	..	..	9·0	2·8	6·4	10	+	–	..	..
	Aug. 23, ,,	8	..	..	..	9·0	2·7	6·3	..	..	..	Blood-urea 86 mg. per 100 ml.	No B.J.
4 (living)	Oct. 2, 1954	6·5	..	..	..	7·6	3·6	..	..	..	..	..	No B.J.
	Dec. 14, ,,	7·5	..	..	..	7·6	3·6	..	10	..	..	..	No B.J.
	Feb. 23, 1955	..	..	..	125 (37°C) 30 (17°C)	7·8	3·6	..	..	..	..	..	No B.J.
	Mar. 17, ,,	7·5	8000	2300	..	7·8	3·6	..	..	..	..	..	..
	May 27, ,,	..	..	..	..	..	..	..	..	..	..	Blood-urea 40 mg. per 100 ml.	..
	Nov. 22, ,,	..	..	..	..	7·4	3·4	..	9	..	..	..	No B.J.
	Dec. 12, ,,	..	..	..	133 (37°C) 72 (20°C) 60 (4°C)	..	..	..	..	..	..	..	..
	Dec. 18, ,,	..	..	..	..	7·7	3·6	4·1	10	+	–	..	..
	Jan. 27, 1956	8·0	..	..	..	..	..	..	..	..	..	..	..
	Aug. 28, ,,	..	..	..	..	7·9	3·5	4·4	10	+	–	Blood-urea 45 mg. per 100 ml.	Trace, no B.J.
	Jan. 9, 1957	..	..	..	..	7·9	3·5	4·4	10	+	–	..	..

* Wintrobe in case 1. † Transfused 4 pints blood. ‡ Transfused 3 pints blood. § Increased (no precise estimation).

TABLE II—ANALYSES FOR PROTEIN

Case	Date	Total protein (Micro-Kjeldahl) (g. per 100 ml.)	Electrophoretic analysis				Ultracentrifugal analysis (after 30 minutes at 250,000 *g*)		
			Albumin	Globulins					
				$\alpha_1+\alpha_2$	β	$\gamma_1+\gamma_2$	$S_{20}w4$	$S_{20}w7$	$S_{20}w18$
			(%)	(%)	(%)	(%)	(%)	(%)	(%)
1	Oct. 17, 1947	7·8	52	..	..	..	70	30	0
	Sept. 14, 1948	8·6	16	6	12	65	47	15	38
	Oct. 16, ,,	8·9	10	8	11	70	..	..	..
	Oct. 18, ,,	9·2	9	8	10	72	47	10	43
2	April 19, 1951	10·7	32	7	14	47	..	..	..
	June 29, ,,	11·7	25	6	13	55	50	19	22
	Aug. 10, ,,	11·15	25	5	14	55	49	15	34
3	Feb. 9, 1956	8·8	31·5	10	9·2	49·3	42	26	30
	Aug. 17, ,,	9·0	31·0	9	9·0	51·0	..	..	..
	Aug. 23, ,,	9·0	..	..	..	..	42	26	30
4	Dec. 18, 1955	7·8	46·8	5·6	9·9	37·8	75	..	25
	Aug. 28, 1956	7·9	46·0	5·0	9·0	40·0	73	..	26
	Jan. 9, 1957	7·9	46·0	6·0	9·0	39·0	73	..	26

mottled red. The liver weighed 1700 g. and seemed normal. The marrow of the femur extended through its whole length and was juicy and red.

Microscopic examination of the lymph-glands and spleen showed that the normal architecture had been preserved, but there was a diffuse infiltration with plasma cells. There was centrilobular fatty change in the liver and increased cellularity of the portal tracts, the cells consisting of lymphocytes, histiocytes, and plasma cells.

Case 3.—A man of 80 was followed for the last 7 years of his life. He was first seen at the age of 72, when he was treated for piles. At that time he was extremely fit for his age. He had no other complaints and no detectable abnormality on physical examination. His urine contained no protein. He was next seen 5 years later, when he complained of increasing weakness and breathlessness over the past 2 years. In the past month he had noticed that he had been passing blood from his bowel and had felt so weak he had kept to his bed. He had never had rheumatism or any bone-pain.

Clinical and Laboratory Findings.—He was pale and listless. There was slight œdema of the ankles. Cardiovascular system normal; blood-pressure 145/80 mm. Hg. No lymph-glands were palpable. The spleen could not be felt. The sternal marrow was normal. Radiography of the skeleton showed some osteo-arthritic changes in the lumbar spine but nothing suggestive of myelomatosis.

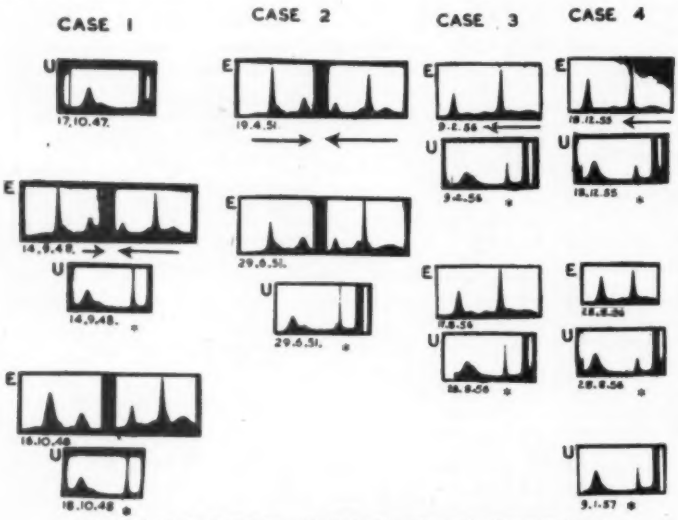

Fig. 1—Analysis of proteins: E, electrophoretic; U, ultracentrifugal. * = heavy component.

The urine contained protein, but no Bence Jones protein. In the serum there was reversal of the albumin/globulin ratio, with a specific increase in globulin. The ultracentrifugal analysis indicated the presence of abnormal amounts of unusually large proteins (fig. 1; U., Feb. 9, 1956).

Course of Illness.—To exclude malignancy, an exploratory laparotomy was performed at which a portion of liver was obtained for histological examination. The spleen appeared normal. Repeated radiography of the bones and pelvis, a year before death, showed no evidence of generalised skeletal disease, either secondary deposits or myelomatosis. Two marrow biopsies, 12 months and 6 months before death, did not suggest a diagnosis of myelomatosis or of leukæmia.

Over the next year his weakness increased and the hæmorrhage from the bowel continued. The liver was now easily palpable two finger-breadths below the right costal margin. He died 12 months after the first ultracentrifugal analysis was made. No necropsy could be obtained.

Liver Biopsy.—Microscopically there was an infiltration of the portal tracts with lymphocytes and a few plasma cells. Staining by the Pappenheim technique showed that the cells had much pyronine-staining material in their cytoplasm. The liver parenchyma appeared normal.

Case 4.—This patient, a woman of 85, is alive. We have followed her clinical progress for 3 years. She has been a widow for 40 years, living alone. 8 months before we first saw her, she was admitted to another hospital with acute abdominal pain. In the course of a thorough examination her urine was said, on one occasion, to contain Bence Jones protein. At that time she was said to be anæmic, but neither by sternal biopsy nor by X-ray examination could a diagnosis of myelomatosis be established, though a radiograph showed chronic arthritic changes in both knee-joints.

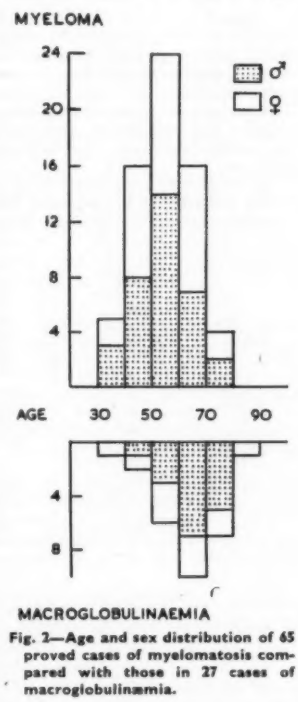

Fig. 2—Age and sex distribution of 65 proved cases of myelomatosis compared with those in 27 cases of macroglobulinæmia.

Examination and Investigations.—She was an alert old woman of reasonably good nutritional state, with some puffy œdema of the eyelids. There was arthritis in both knee-joints and a tendency to bruising and subcutaneous hæmorrhage, though there was no history of epistaxis or mucosal bleeding. The spleen was just palpable.

The hæmoglobin was 8·1 g. per 100 ml., and the albumin/globulin ratio was inverted. The sternal marrow showed no gross abnormalities and no excess of plasma cells. Radiographs of the skull, sternum, pelvis, and long bones confirmed the previous findings, there being no lesions suggestive of myelomatosis.

Course of Illness.—Over the three years' study there has been some increase in œdema, an increased tendency to bruising but no other striking clinical change. There have been repeated traces of protein in the urine, but the presence of Bence Jones protein has never been confirmed.

Discussion

The demonstration of macroglobulinæmia depends on a quantitative ultra-

centrifugal analysis under carefully prescribed conditions. Nevertheless, the presence of excess macromolecules may be suspected where the fresh blood exhibits excessive rouleaux-formation, and the fresh serum is excessively viscous at room-temperature or produces a definite protein precipitate when diluted with twenty times its own volume of freshly distilled water, the precipitate being soluble in 0·15 M sodium-chloride solution.

The four cases reported illustrate the diverse clinical picture that may be associated with the presence of an excessive amount of abnormal circulating macroglobulins. One of us (N. H. M.) has had the opportunity of examining the serum from five other patients and confirming the presence of macroglobulins in excessive amounts in each of them. Three were males and two females.

Age and Sex Incidence.—In fig. 2, the age and sex distribution of twenty-seven patients with macroglobulinæmia are compared with those of sixty-five consecutive patients with myelomatosis whom we have seen. The comparison does not suggest that either age or sex is helpful in differentiating the two conditions; but it does suggest that the commonly held view that macroglobulinæmia is three times commoner in males than females (Ferriman and Anderson 1956) is wrong. The early report (Bayrd and Hecht 1947) that myelomatosis was three times commoner in males than females is not borne out by more recent series (Heizir and Schwartzmann 1952, Lichtenstein 1952).

Duration of the Condition.—In the case reported by Bichel et al. (1950), the patient was first examined in 1935, but the ultracentrifugal analysis was done in 1947, the year of his death. Other patients have been described (Mcfarlane et al. 1952) with remarkable histories of recurrent episodes of illness lasting up to 10 years. They suggest a continuous disease process, even though the circulating macroglobulins were demonstrated late in the disease.

The Relation of the Macromolecules to the Clinical Progress.—It is not clear whether previous authors have assumed that excessive amounts of abnormal macroglobulins are present from the onset of symptoms; if macroglobulins are the essential feature of the process, as Waldenström suggests, it would seem reasonable to do so. The history and findings in case 1, therefore, are important. When first seen the patient had already felt ill for 2 years and had an easily palpable spleen, and though the precise diagnosis was in doubt she was sufficiently ill to need to be nursed in hospital. After very careful investigation, she was thought to have some form of reticulosis. At the time, our knowledge of the detailed disturbance of her circulating proteins was scanty, and though there seemed to be no disturbance of the albumin/globulin ratio, an ultracentrifugal analysis was done (fig. 1; U, Oct. 17, 1947). This was normal, and since subsequent analysis of the sera of other patients with reticulosis showed no constant abnormal features, the findings did not contribute to the diagnosis. Some months later, as her disease progressed, the level of her circulating hæmoglobin dropped and it was noticed that there was a reversal of the albumin/globulin ratio, without striking increase in the level of her total circulating proteins. Electrophoretic analysis (fig. 1; E, Sept. 14, 1948) suggested that this increase was mostly due to the presence of a discrete component resembling γ-globulin. The general appearance of the electrophoretic analysis resembled analyses we had made of the sera of patients with myelomatosis, rather than those in lymphatic leukæmias or reticuloses. The absence of any "bone" pain, the grossly enlarged spleen, and the negative findings of both radiography and marrow biopsy suggested that if this patient had myelomatosis it was in a very unusual form. Moreover, the behaviour of the serum to the flocculation tests was not that commonly associated with myelomatosis (Maclagan et al. 1952). At this time a significant amount of the abnormally large globulin became demonstrable by ultracentrifugal analysis, and a precipitate formed when the serum was diluted with twenty times its volume of water. Splenic biopsy suggested a diagnosis of a pleomorphic reticulosis. Combining the histological finding and the clinical picture, we thought that the chemical findings did not offer a constructive alternative diagnosis. We suggested that the gradual reduction and increasing temperature dependence of the E.S.R. must be due to the gross increase of viscosity of the serum. Clumping and rouleaux-formation, a feature often associated with an increased E.S.R., were conspicuous in this patient's blood as they were in the other patients examined. We surmised that the anæmia might be due to "stifling" of the bone-marrow by the turgid macromolecules, and that their presence had contributed to the more rapid downhill progress which ended in coma and death, but that they were not the essence of the disease.

In case 2 there was an indeterminate period which the patient dated back to a stillbirth 3 years before, an episode imprinted on her mind but difficult to relate to her condition when we saw her. 4 months before admission she had noticed some blurring of vision, and from then on there was rapid deterioration in her general condition. On first examination there was gross derangement of her serum-protein pattern (fig. 1; E, April 19, 1951), the electrophoretic appearance (as in case 1) resembling that of myelomatosis. The ultracentrifugal analysis of the serum (fig. 1; U, June 29, 1951) indicated the presence of an excessive amount of abnormally large protein molecules. This patient's urine was regularly loaded with "Bence Jones" protein and, in spite of the unusual clinical picture and the absence of radiological and biopsy evidence, we wondered, for want of an alternative diagnosis, whether she had an unusual form of myelomatosis. The necropsy seems to exclude this, unless one is to postulate a type of visceral plasmocytosis in which there is a diffuse proliferation of plasma cells, a condition forming a link between the classical myelomatosis and the "plasma-cell leukæmias." The histological appearances of the spleen resembled those of the plasma-cell leukæmias recorded by Moss and Ackerman (1946) and Lüden (1946).

The clinical histories in cases 3 and 4 differ from each other and from the first two reported. In both patients we have successive record of the presence of macroglobulins (fig. 1) unassociated (certainly in case 4 and probably in case 3) with any dramatic change in clinical condition. Indeed, though our fourth patient had a little œdema, some liability to bruising and hæmorrhage, and a moderate anæmia, we wonder how many who have had to fend for themselves as vigorously as she will be in better case at 85. We do not propose investigating her more than we have already, preferring that she should live in peace, a witness to the irrelevance of macroglobulins in clinical prognosis.

The Histological Picture.—Lennert (1955) has described the variable histology associated with macroglobulinæmia. It is noteworthy that material collected from our patients has only one histopathological feature in common, a considerable increase in cells whose cytoplasm was rich in pyronine-positive staining material. This is a feature common to the majority of conditions associated with hypergammaglobulinæmia, whether or not excess of macroglobulins be present. It is worth noting that the superficial examination of the sections of liver stained with hæmatoxylin and eosin in case 3 suggested a predominantly lymphocytic infiltration, though specific staining showed that many of the cells were strongly pyroninophilic. Lymphocytosis has been regarded as one of the characteristics of "macroglobulinæmia," and though our experience suggests that absolute lymphocytosis is not common, it might be useful to examine the "lymphocytes" in histological material from

other cases by the Unna-Pappenheim technique, to determine whether there is an excess of pyronine-staining cells.

On clinical and histopathological grounds there seems little justification for the separation of a disease entity "macroglobulinæmia."

The use of such expressions as "dysproteinæmias" and "paraproteinæmias" (Mackay et al. 1957) add little to the sum of knowledge; for, if the proteins are the building-stones of our bodies, there can be few diseases in which there is not a degree of dysproteinæmia and in which increasing technical skill will not demonstrate "paraproteins."

Summary

Four cases are reported in which macroglobulins were demonstrated in the serum.

The differences in the clinical picture and histopathology, coupled with the fact that in one patient macroglobulins were absent at a time when her disease was well established, challenges the justification for perpetuating the syndrome "macroglobulinæmia."

Our special thanks are due to the physicians who gave us access to their clinical notes and allowed us to examine and follow up these patients; to Dr. F. G. Herman, Prof. T. Crawford, and Dr. D. Dexter for making their pathological reports available and for much stimulating discussion; and to Mr. H. S. Murray for technical assistance.

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THE ARTERIAL BED OF THE LUNG IN PULMONARY HYPERTENSION

D. S. SHORT
M.A., M.D. Camb., M.R.C.P.
LEVERHULME SCHOLAR, INSTITUTE OF CLINICAL RESEARCH AND EXPERIMENTAL MEDICINE, MIDDLESEX HOSPITAL, LONDON

With illustrations on plate

A PERSISTENT rise of pulmonary arterial pressure, sufficient to cause enlargement and ultimately failure of the right ventricle, complicates several common diseases —notably mitral stenosis, certain congenital cardiovascular defects, and chronic lung disease. Pulmonary hypertension may also follow repeated pulmonary embolism or be found alone.

The mechanism responsible for the maintenance of pulmonary hypertension is disputed. It is agreed that there is an increased resistance to blood-flow through the arterioles and small arteries of the lung. The point at issue is the nature of this increased resistance. The majority of workers regard the basic disorder as a widespread vasoconstriction on which, in most cases, there ultimately develops structural disease, but some regard the structural disease as the basic lesion. This question has an important bearing not only on prognosis and treatment but also on the search for the ultimate cause of pulmonary hypertension.

The main evidence for a functional as against a structural mechanism is the fact that the pulmonary vascular resistance may be lowered by certain drugs—e.g., hexamethonium (Davies et al. 1954, Wade et al. 1956) and acetylcholine (Harris 1955, Wood 1956)—and, in the case of mitral stenosis, by valvotomy (Wood 1954, Soulié et al. 1956). It is also contended that the extent of the arterial disease demonstrated at necropsy is insufficient to explain the high vascular resistance present during life. Indeed, arterial disease has sometimes been reported to be absent even in cases of solitary (or primary) pulmonary hypertension (Soothill 1951, McKeown 1952).

The extent of the structural changes cannot, however, be accurately determined by examining random histological sections, for these do not provide an adequate picture of the arterial bed as a whole. Arteries are sometimes occluded for short distances only, and appear normal in sections taken above and below the point of obstruction (Spencer 1950). Moreover branches otherwise healthy are often constricted at their origin by intimal proliferation in the parent artery (Lindbom 1950). Such focal narrowing may be missed unless serial sections are taken throughout the lungs—an impracticable task.

To display the entire pulmonary arterial bed, it was decided to study lungs from patients with pulmonary hypertension by post-mortem arteriography. Evans (1951) first emphasised the value of this procedure, and Dr. J. P. Shillingford, with the help of Mr. C. H. Sykes, developed a reliable technique at the London Hospital.

Material

66 arteriograms were made on lungs removed at necropsy. The diagnoses were as follows:

Diagnosis	*No. of cases*	*Severe pulmonary hypertension*
Mitral stenosis	18	9
Congenital heart-disease	8	5
Other varieties of heart-disease	8	3
Chronic lung disease	11	6
Solitary pulmonary hypertension	6	6
Recurrent pulmonary embolism	2	2
Systemic hypertension	4	1
Miscellaneous	9	0
Total	66	32

LEGENDS TO ILLUSTRATIONS ON PLATE

DR. SHORT

Fig. 1—Medium-sized arteries in pulmonary hypertension.

a, Contact print from section of normal lung 1 cm. thick after injection of bismuth oxychloride-gelatin suspension into main pulmonary artery of intact lung (approx. life size).

b, Arteriogram (prepared in same way as *a*) in pulmonary hypertension, showing many arteries blocked by intimal proliferation (approx. life size).

c, Arteriogram (prepared in same way as *a*) in pulmonary hypertension, showing diffusely narrowed arteries, although histological examination proved them to be fully distended by radio-opaque medium (approx. life size).

d, Normal muscular artery from uninjected lung stained for elastic tissue (× 100).

e, Muscular artery from uninjected lung (stained as *d*) in pulmonary hypertension, showing lumen narrowed by intimal proliferation, and focal thinning of media (× 100).

f, Muscular artery from uninjected lung (stained as *d*) in pulmonary hypertension, showing lumen narrowed by arterial contracture, which has given rise to thickening of wall simulating hypertrophy (× 100).

Fig. 2—Small arteries and arterioles in pulmonary hypertension.

a, Arteriogram of normal lung lobule (× 5).

b, Arteriogram of lung lobule in pulmonary hypertension, showing diffuse narrowing of arteries and arterioles (× 5).

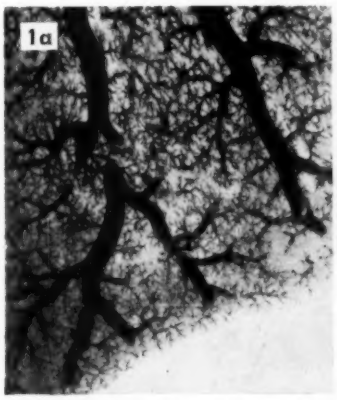
c, Normal arteriole from uninjected lung stained for elastic tissue (× 300).

d, Contracted muscular artery from uninjected lung (stained as *c*) and with diam. 0·067 mm. (normal at least 0·1 mm.) in pulmonary hypertension (× 300).

e, Contracted arteriole from uninjected lung (stained as *c*) in pulmonary hypertension, showing characteristic palisading of endothelial nuclei (× 300).

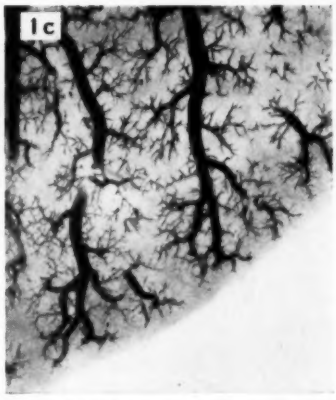
DR. SHORT: PULMONARY HYPERTENSION

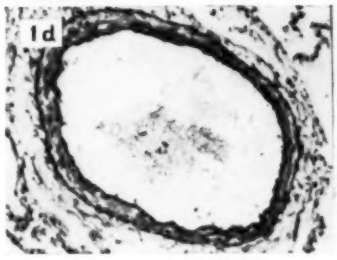
NORMAL PULMONARY ARTERIES

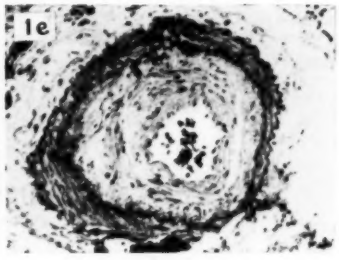


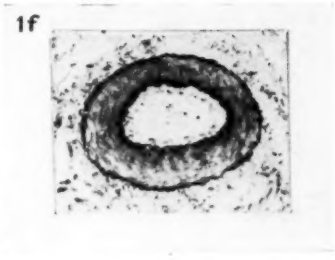
INTIMAL PROLIFERATION

ARTERIAL CONTRACTURE

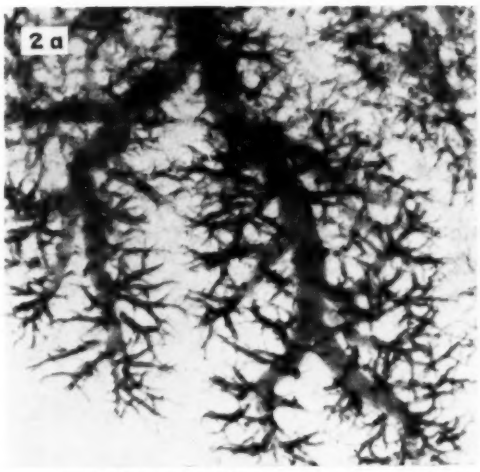




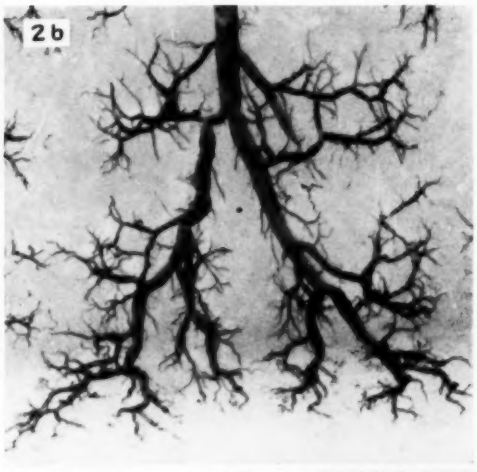


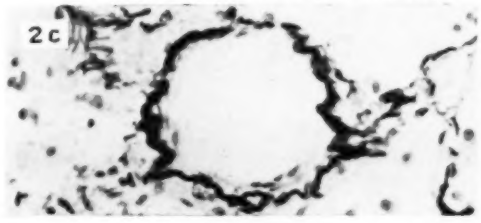


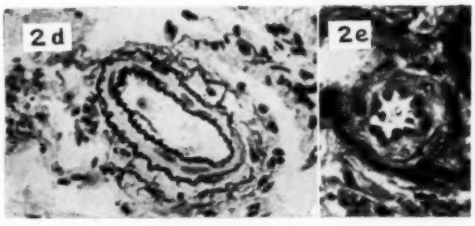
NORMAL ARTERIES AND ARTERIOLES



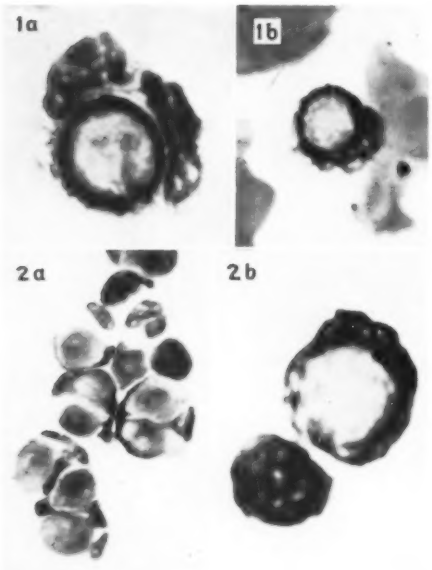
ARTERIAL AND ARTERIOLAR CONTRACTURE



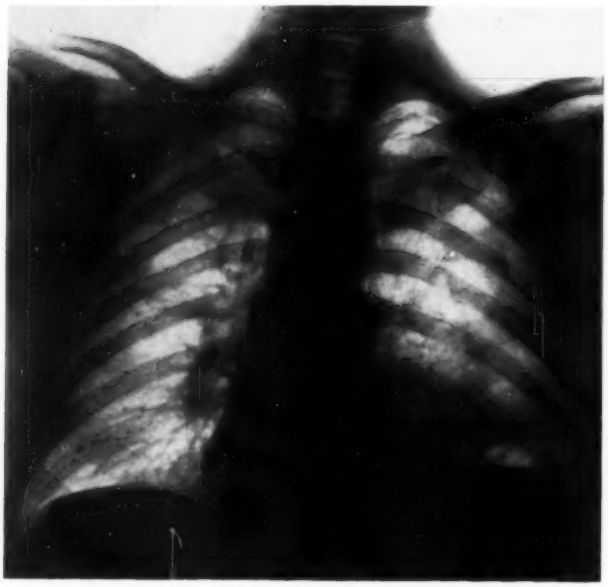




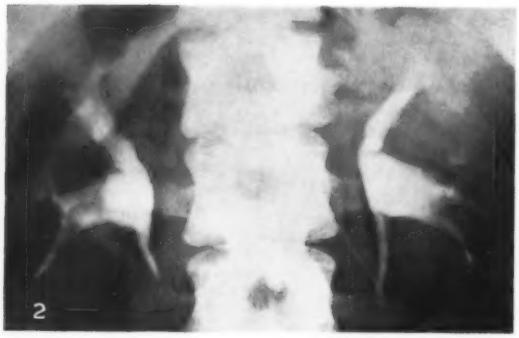
DR. BERLYNE & OTHERS : L. E. FACTOR



DR. WRIGLEY : RUPTURE OF THE DIAPHRAGM



DR. DORMANDY & OTHERS :
RENAL FAILURE AFTER AORTOGRAPHY



MR. ROY :
RENAL FAILURE AFTER AORTOGRAPHY

In 32 cases there was severe pulmonary hypertension judged by hypertrophy of the right ventricle to a thickness of at least 7 mm. (normal 3–4 mm.) in the absence of pulmonary valvular or subvalvular stenosis. Most of these patients were investigated during life by cardiac catheterisation, which confirmed the presence of pulmonary hypertension. Although most of the patients with severe hypertension had been disabled for at least a year, a few died within six months of the onset of symptoms.

Method of Investigation

At necropsy one lung was removed intact and kept for arteriography. The other was examined in the usual way, from three to ten blocks being retained for microscopy. Since the technique of arteriography has been described in detail elsewhere (Short 1956), only a brief outline will be given here.

The intact lung was warmed by immersion in water at 40–45°C. A cannula was tied into the pulmonary artery, and the radio-opaque medium, usually a bismuth oxychloride-gelatin suspension, was injected at a temperature of about 70°C. The injection pressure was 50 mm. Hg for cases without pulmonary hypertension, and 100 mm. Hg for those with hypertension. The object of the heating and the high pressure was to overcome post-mortem contraction and to produce full distension of the arteries and arterioles. When the injection was complete, the pulmonary artery was ligated. The lung was then inflated and radiographed stereoscopically. After fixation in formalin it was sectioned, and these sections were radiographed on 'Kodaline Standard' film, which permits enlargement up to 25 diameters. Histological sections were taken and examined before any conclusions were drawn from the arteriogram to ensure that the arteries and arterioles were fully distended by the radio-opaque medium.

Findings

In cases without pulmonary hypertension the arterial bed was filled uniformly as far as arterioles with a diameter of 0·03 mm. (figs. 1a and 2a). The opaque medium did not penetrate beyond this and therefore did not enter the capillaries. In most lungs a few small arteries were occluded by thrombus, and occasionally a single segmental artery was obstructed, but there was never any significant reduction in the total pulmonary bed.

In severe pulmonary hypertension the pulmonary arterial bed was always greatly reduced (figs. 1b and c and 2b), even in those cases in which symptoms had been present for only a few months. In recurrent pulmonary embolism the reduction in the arterial bed was due to obstruction of several large arteries. In the other varieties of pulmonary hypertension it was due principally to widespread narrowing or occlusion of the muscular arteries (0·1–1·0 mm. in diameter) and arterioles (less than 0·1 mm. in diameter); though, in these cases also, one or more of the large arteries was often obstructed by thrombus. Correlation of the arteriographic and histological findings demonstrated the existence of two main processes responsible for the reduction in the peripheral arterial bed—intimal proliferation and arterial contracture.

Intimal Proliferation

In nearly every case of pulmonary hypertension some arteries were narrowed by abnormal intimal tissue. In the elastic arteries (over 1·0 mm. in diameter) this tissue usually had the histological characteristics of organised thrombus. In the muscular arteries and arterioles, on the other hand, its nature was often uncertain, and for this the term intimal proliferation is used (fig. 1e). The fact that intimal proliferation is often associated with medial thinning led Gilmour and Evans (1946) to suggest that it originates as a reparative process over a focus of congenital weakness in the arterial wall.

Intimal proliferation was a prominent feature in pulmonary hypertension associated with congenital heart-disease. In these cases there was widespread narrowing or occlusion of arteries up to 1 mm. in diameter. A similar picture was sometimes seen in solitary pulmonary hypertension, but in this disease the obstruction was more frequently found in arteries with a diameter of less than 0·2 mm., and significant intimal proliferation was occasionally absent (Evans, Short, and Bedford 1957). In mitral stenosis intimal proliferation was greatest in the arterioles, a high proportion of which were much narrowed; but arteries with a diameter of 0·1–0·2 mm. were also affected in many instances (Evans and Short 1957).

Arterial Contracture

In many cases of pulmonary hypertension arteriography showed a diffuse narrowing of the peripheral arteries and arterioles throughout the lung (figs. 1c and 2b); the calibre of the affected vessels was reduced to between two-thirds and half of the normal. In mitral stenosis the segmental arteries in the lower half of the lung were also constricted. The bore of these arteries was usually smooth, but occasionally there were indents due to superadded intimal thickening. On histological examination of the injected lung, the arteries were found distended to their full capacity, as shown by the fact that their elastic laminæ were quite smooth. In the uninjected lung the walls of the small muscular arteries appeared unusually thick (fig. 1f), a muscular coat was present in vessels of arteriolar size (fig. 2d), and the arterioles showed palisading of the endothelial nuclei round a narrowed lumen (fig. 2e).

What is the nature of this diffuse narrowing of the arterial lumen? It is not due to simple vasoconstriction, for the arteries in the injected lung were fully dilated. Is it due to medial hypertrophy?

Thickening of the media of the smaller arteries in the lung has long been recognised as a feature of pulmonary hypertension and was present in these cases; but, although this appearance has commonly been described as hypertrophy, histologists have realised that this was only an inference. The degree of post-mortem arterial contraction varies so greatly from one case to another that it is impossible to be sure that true hypertrophy is present unless actual measurements are made. O'Neal et al. (1955) have measured the cross-sectional area of the media of the small muscular pulmonary arteries in 67 cases of either moderate or severe mitral stenosis and in a control series of comparable age without heart-disease. They could not find any significant increase

LEGENDS TO ILLUSTRATIONS ON PLATE

DR. BERLYNE AND OTHERS

Fig. 1a—Case 1. L.E. cells: mother, a month after parturition (×1700).
Fig. 1b—Case 1. L.E. cells: baby, a month old (×1100).
Fig. 2a—Case 2. L.E. cells: mother, 6 weeks after parturition (×900).
Fig. 2b—Case 2. L.E. cells: baby, 3 weeks old (×1700).

DR. WRIGLEY

Fig. 1—The unusual appearance of the chest radiograph taken soon after admission to hospital

DR. DORMANDY AND OTHERS

Fig. 2—Intravenous pyelogram performed before renal angiogram, showing both kidneys excreting well and equally.
Fig. 3—Renal angiogram: the left kidney is excreting contrast medium, but there is little evidence of excretion on the right side.

MR. ROY

Fig. 1—Aortogram showing atrophic right renal artery.
Fig. 2—Aortogram: Nephrographic phase.

in the media in mitral stenosis and concluded that the arteries were not hypertrophied.

The arterial narrowing observed in the arteriograms cannot be due to hypertrophy, because in the injected lungs the walls account for less than 5% of the external diameter of the arteries, whereas the calibre is reduced by 33–50%. Thus both the external and internal diameters are reduced; the arteries are in fact smaller and less distensible than normal. It is for this state of persistent organic narrowing that the term "arterial contracture" is suggested.

Arterial contracture simulates medial hypertrophy because shortening of the circumference leads to a corresponding thickening of the wall. The concept of arterial contracture also explains the presence of a muscular coat in vessels of arteriolar size. This appearance has been reported in mitral stenosis (Henry 1952, Soulié et al. 1953, Heath and Whitaker 1955b), congenital cardiovascular disease (Heath and Whitaker 1955a), and solitary pulmonary hypertension (Carpenter and Prichard 1956). In the past these vessels have been described as muscularised arterioles, but apart from their size they look exactly like muscular arteries (fig. 2d), and there can be little doubt that they are in fact muscular arteries in a state of contracture. Wade and Ball (1957) have actually shown, by serial section in a case of solitary pulmonary hypertension, that such arteries lead into typical arterioles.

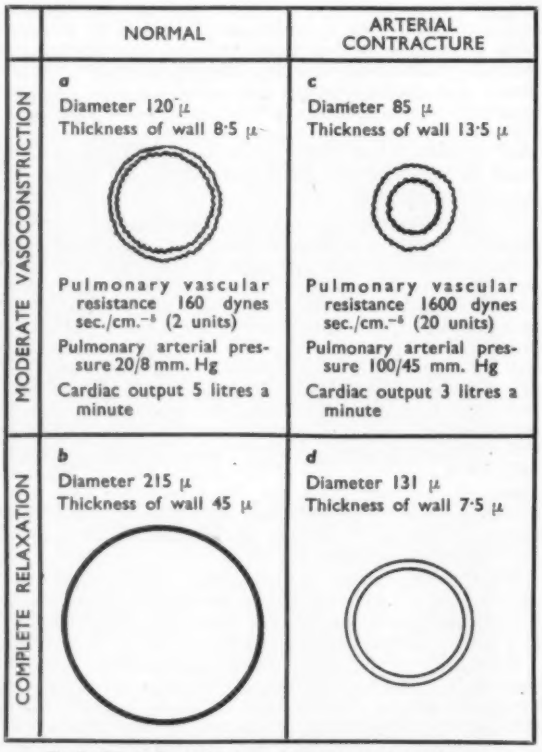


Fig. 3—Effect of arterial contracture on vascular resistance.

a, Normal small muscular artery.

b, Same artery completely relaxed.

c, Same artery after development of contracture. This moderate narrowing, if generalised, would increase pulmonary vascular resistance about tenfold. There is no hypertrophy of arterial wall, cross-sectional area of media being the same in all four diagrams.

d, Same artery as in *c* completely relaxed, showing how resistance may be lowered in spite of organic arterial disease.

How does arterial contracture arise? Is it congenital or acquired?

Fœtal pulmonary arteries have relatively thick walls, and Edwards (1950) has suggested that the presence of thick-walled arteries in adults with pulmonary hypertension represents a persistence of the fœtal state. Pulmonary hypertension is, however, so much commoner in mitral stenosis than in the rest of the population that it is impossible to believe that the hypertensive vascular disease is an independent condition present from birth. It is much more likely that the contracture is acquired.

Bayliss (1902) showed that the muscular coat of arteries, like smooth muscle in other situations, reacts to a stretching force by contraction. It seems reasonable, therefore, to suggest that moderate pulmonary hypertension induces vasoconstriction, which, if it persists, leads ultimately to permanent shortening of the muscle-fibres and elastic laminæ.

Effect of Arterial Narrowing on Resistance to Blood-flow Through Lungs

Poiseuille's law indicates that the pressure within a tube varies inversely with the fourth power of its radius. This law cannot be applied without qualification to the arterial circulation, but it has been shown to furnish valuable approximations which are at least of the right order, provided the pressure is sufficiently above the critical closing pressure of the small vessels (Burton 1952). Thus a small change in calibre has a profound effect on pressure.

In arteriograms showing arterial contracture the calibre of the peripheral arteries throughout the lung was reduced to between two-thirds and half of the normal. On the basis of Poiseuille's law, a reduction of 33% would be sufficient to raise the resistance fivefold, while a reduction of 50% would raise the resistance sixteenfold. In severe pulmonary hypertension the pulmonary vascular resistance is about ten times the normal; hence the degree of narrowing shown on arteriography would largely explain the abnormal resistance present during life (fig. 3). In several cases almost all the original pulmonary arteries were either occluded or severely stenosed at some point, and the circulation was maintained only by the development of abnormal collateral channels.

There is no doubt that in severe pulmonary hypertension extensive organic arterial disease is present; indeed, it is far more extensive than has hitherto been recognised. It is this factor which accounts for the serious prognosis in established hypertension and its poor response to treatment. The fact that the resistance can be temporarily lowered by drugs is not surprising, for there are always some segments of artery which are relatively normal; arteries which have undergone contracture are still capable of considerable relaxation (fig. 3), and even vessels with marked intimal thickening will relax to some extent (McWilliam and Mackie 1908).

Summary and Conclusions

66 lungs were studied by a combination of arteriography and histology. 32 were from patients with pulmonary hypertension, including mitral stenosis, congenital heart-disease, chronic lung disease, recurrent pulmonary embolism, and solitary pulmonary hypertension.

In every case of pulmonary hypertension there was a great reduction in the pulmonary arterial bed. In addition to thrombosis in the larger arteries, two forms of peripheral arterial narrowing were recognised. One was intimal proliferation, in which thrombosis with subsequent organisation probably played a part. The other was diffuse arterial contracture—a state of persistent organic narrowing and indistensibility. Intimal prolifera-

tion has long been recognised, though its extent has been underestimated; but arterial contracture has been mistaken for hypertrophy because the contracted arteries have thick walls.

Structural changes in the lung arteries in pulmonary hypertension are far more extensive than has been supposed. They are of the greatest importance in maintaining the hypertension and are responsible for its serious prognosis and resistance to treatment.

I am greatly indebted to Dr. William Evans, Dr. Evan Bedford, and Prof. A. Kekwick for criticism and encouragement.

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PLACENTAL TRANSMISSION OF THE L.E. FACTOR

REPORT OF TWO CASES

G. M. BERLYNE
M.B. Manc., M.R.C.P.
SENIOR HOUSE OFFICER, UNIVERSITY DEPARTMENT OF MEDICINE

I. A. SHORT
M.B. Glasg., M.R.C.P., F.R.F.P.S.
SENIOR MEDICAL REGISTRAR

C. F. H. VICKERS
M.B. Manc., M.R.C.P.E.
FORMERLY REGISTRAR TO THE DEPARTMENT OF CARDIOLOGY
MANCHESTER ROYAL INFIRMARY

With illustrations on plate

THE lupus-erythematosus cell was first described by Hargraves et al. in 1948. It is a polymorphonuclear leucocyte with a large acidophilic-staining intracytoplasmic inclusion which displaces the nucleus to the periphery of the cell. In up to 90% of cases of systemic lupus erythematosus (S.L.E.), large numbers of L.E. cells are demonstrable in preparations of peripheral blood or bone-marrow (Bridge and Foley 1954). The L.E.-cell phenomenon, it is suggested, is due to the L.E. factor, which migrates electrophoretically with the gamma-globulin fraction of the plasma-proteins, reacting with damaged nucleoprotein in the presence of living polymorphonuclear leucocytes to produce the characteristic inclusions of depolymerised desoxyribonucleic acid (Snapper and Nathan 1955). Gamma-globulins associated with immunity against infection are known to pass the placental barrier, and it was therefore inferred that the gamma-globulin associated with the L.E. phenomenon might also pass the placental barrier. The blood of two patients with S.L.E. in pregnancy, and of their infants after delivery, was examined serially using a convenient finger-prick technique (Lempert and Berlyne 1957). Two similar cases have been recorded by Bridge and Foley in 1954—a total of four to date.

Case-reports

Case 1.—A housewife, aged 25, had had rheumatic fever and chorea at the age of 9. When she was 19 she had joint and pleural pain and hæmoptysis, and the typical rash of discoid lupus erythematosus. This illness subsided spontaneously. Signs of mitral stenosis were noticed at that time. A year later she had another episode of pleural pain, with pleural and pericardial effusions. She was admitted to Crumpsall Hospital, under the care of Dr. G. G. E. Smyth. No evidence of tuberculosis could be found. Cardiac tamponade necessitated paracentesis of the pericardium, and a therapeutic trial with cortisone was dramatically successful.

A year later, malaise and arthralgia recurred, this time with lymphadenopathy and the typical skin lesions of S.L.E. on the face and fingers. Response to corticotrophin (A.C.T.H.) was excellent, and she was symptom-free in 3 weeks; treatment was discontinued after a further week. This attack was followed by a period of relative freedom, though arthralgia and rashes recurred occasionally and were treated with mepacrine and bismuth. In April, 1955, she had hæmaturia, which was fully investigated by a urologist with negative results; at this time she had no other symptoms suggestive of systemic lupus erythematosus and the hæmaturia was thought to be due to an attack of acute cystitis.

In August, 1955, at the age of 25, she became pregnant and was supervised in the cardiac pregnancy clinic at the Manchester Royal Infirmary. Throughout the pregnancy there was no clinical evidence of reactivation of the S.L.E., though the L.E. phenomenon was observed in peripheral blood on occasions. Plasma-protein patterns were slightly abnormal (albumin 3·1, globulin 3·9 g. per 100 ml.). Judged by concentrating and diluting power and urea-clearance, renal function was excellent and there was no albuminuria. Delivery at full term was by low forceps because of fœtal distress, but was otherwise uneventful. During the next few weeks the mother's condition gave rise to no anxiety, but the plasma-proteins became grossly abnormal (albumin 3·3, globulin 5·6 g. per 100 ml.) and many L.E. cells were found in the peripheral blood, the only clinical manifestation being a recurrence of the rash. She began to improve spontaneously without steroid therapy 6 weeks after delivery. When seen again 6 months after delivery, she was very well with normal plasma-proteins (albumin 3·5 g. globulin 3·4 g.) and no L.E. cells in peripheral blood.

The child, whose birth-weight was 6 lb. 13 oz., thrived well, but large numbers of L.E. cells were observed in the peripheral blood up to the age of 7 weeks. Breast-feeding ceased at the age of 6 weeks because of poor secretion.

Case 2.—A married woman, aged 39, was first seen in 1952 because of pyrexia and generalised aches and pains. She gave a history of "rheumatoid arthritis," mainly in the hands and feet, for 10 years. Over the next year she developed the typical rash of S.L.E. on the fingers, toes, and nose. Cortisone therapy was begun in September, 1953, and continued with very little success till March, 1955. The dosage was seldom greater than 50 mg. a day, occasionally 75 mg., and often only 25 mg. Cortisone was stopped because of septic infection in the toes, associated with poor peripheral circulation.

She became pregnant for the first time in September, 1955, and at the end of December became acutely dyspnœic on the slightest exertion. At this time the hæmoglobin had fallen to 58% (Haldane) (colour-index 0·81) and the serum-globulin was 5·5 g. per 100 ml., with particular increase in gamma-globulin. L.E. cells were not found at this time. There was no sign of cardiac failure, except crepitations at both lung bases. A chest radiograph showed increased vascularity at the lung bases, but no cardiac enlargement. After treatment with oral and intravenous iron, the hæmoglobin rose, and she was able to lead a very restricted life at home for the remainder of the pregnancy. Occasional L.E. cells were found several times in May, 1956. She had an elective lower-segment cæsarean section on June 7, 1956 (Dr. A. H. C. Walker). The child was a normal boy weighing 6 lb. $10^1/_2$ oz. at birth. She

made an excellent recovery following some initial "shock" for which she was given a pint of blood. The dyspnœa improved immediately after delivery. Breast-feeding was attempted, but supplements were required, and a week after delivery it was abandoned.

The hæmoglobin was 82% on June 2, 1956, and 86% on June 18, 1956. L.E. cells were present in the cord-blood and at the age of 7 days they were demonstrated in heel-prick blood in the infant, but not in the mother at this time. By the 7th week after delivery, no L.E. cells were seen in the infant's blood. They were present in the mother's blood in large numbers at this time. When last seen, the infant was thriving and had no abnormal physical signs.

Discussion

The presence of the L.E. cells in preparations of peripheral blood is an important confirmatory laboratory test in the diagnosis of systemic lupus erythematosus. It is not specific, however, as it has been found in other conditions, such as sensitivity reactions to penicillin and apresoline, polyarteritis, and even chronic hepatitis (Hargraves and Opfell 1956, Joske and King 1955). In the cases reported here the diagnosis of S.L.E. was made on strong clinical grounds in the mothers, but there was no evidence of ill health in either child, though the L.E. factor was present in their plasma. The subsequent disappearance of the L.E. phenomenon after 7 weeks in both infants was similar to the findings in Bridge and Foley's first case. Their second case was reported as an addendum to their article and follow-up details were omitted. It is noteworthy that there was no direct correlation between the number of L.E. cells in the mother and in the child at the same time, the infants' blood showing a more constant and greater number of L.E. cells than the mothers', in whom there were striking variations from week to week. This variation is common in severe S.L.E. (Berlyne, unpublished observations). The intensity of the L.E. phenomenon was far greater in the child who was breast-fed initially for several weeks.

Pregnancy is rarely complicated by S.L.E., the total number of reported cases in the world literature being eighty-seven (Merrill 1955). Familial incidence of S.L.E. has been reported briefly in four cases (Shearn and Pirofsky 1952). The only record of inherited S.L.E. (as opposed to passive transfer of the L.E. factor) which has appeared in detail in English is that of Glagov and Gechman (1956) in which S.L.E. developed in a woman aged 44; the initial symptoms of the disease appeared in her daughter when she was 14. The infants of both our patients had no signs of abnormality at the age of 6 months, but it is as yet too early to speculate on the possibility of the development of frank systemic lupus in later life.

Summary

Two cases of systemic lupus erythematosus in pregnancy are reported in which there was transmission of the L.E. factor to the infants. The L.E. cell was not demonstrable in either infant after the age of 7 weeks. The babies were clinically healthy. S.L.E. complicating pregnancy, and inheritance of S.L.E., are both rare.

We wish to thank Dr. C. S. D. Don, Dr. A. Morgan Jones, and Dr. G. G. E. Smyth for permission to report these cases. We are especially indebted to Prof. Robert Platt for much fruitful discussion and constructive criticism, and for reading the manuscript.

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ACUTE RENAL FAILURE AFTER AORTOGRAPHY

A. D. ROY
M.B. Glasg., F.R.C.S., F.R.C.S.E.
SENIOR REGISTRAR, DIVISION OF SURGERY, RADCLIFFE INFIRMARY, OXFORD

With illustrations on plate

SINCE Dos Santos et al. (1929) first injected radio-opaque contrast medium into the abdominal aorta to study the vessel and its branches, this method has grown in popularity, at first slowly but in recent years with greater rapidity. From the first, when Dos Santos used 100% sodium iodide as a contrast medium, its risks were recognised, but with the introduction of the organic iodides the method has become much safer. Nevertheless renal damage is still reported, and the case described here has several interesting points.

Case-report

A man, now aged 36, was in good health and free of urinary symptoms until 1946, when he had an episode of urinary infection with frequency, dysuria, and hæmaturia. He was treated in another hospital and was free from symptoms in ten days. In 1949 he had pain in his right testicle for three days, and the pain settled spontaneously. During the following year he had occasional pain in his right loin which did not worry him; but, when he was examined for the Civil Service in February, 1956, it was decided to investigate his urinary system.

Investigation.—His blood-urea level was 26 mg. per 100 ml., his urine was sterile, and an intravenous pyelogram showed "no excretion on right side; slight dilatation of the left pelvis." Cystoscopy on June 6 showed a normal bladder with no efflux from the right ureter; a right retrograde pyelogram showed "that there might be a pelviureteric obstruction with associated hydronephrosis"; and aortography was advised. His blood-pressure was 130/70 mm. Hg, and his urine contained less than 10 mg. of protein per 100 ml. and a few red cells.

Aortography.—On June 13 an aortogram was done under general anæsthesia with a relaxant. A preliminary injection of 10 ml. of 30% sodium acetrizoate was followed by 25 ml. of 60% sodium acetrizoate given rapidly with mechanical aid. Reported as follows: "The right renal artery is very small and atrophic. In the nephrographic phase some small rims of functioning tissue are shown. The left kidney is very well shown in the nephrographic phase. The appearances are those of a large hydronephrosis" (figs. 1 and 2).

Nephrectomy and Progress.—On June 14 the large hydronephrotic right kidney was uneventfully removed. The rim of functioning tissue showed many areas of necrosis, and microscopically a well-marked cortical necrosis was confirmed (fig. 3). Postoperatively the output of urine decreased until, on the 6th day after the aortogram, only 3 oz. of urine was passed. The urine contained large amounts of protein, its specific gravity was 1·010, and the concentration of urea was 1%. The blood-urea level had risen to 326 mg. per 100 ml. As soon as urinary suppression was noted, the patient was placed on a restricted intake of fluid with glucose orally; and, when it became obvious that renal damage was severe, a 'Polythene' catheter was passed up the left long saphenous vein to the mid-thigh, and 50% glucose in water was administered slowly. To each pint of fluid heparin 500 units was added, and this single drip ran from the 7th to the 13th day before the vein became inflamed. 8·4 litres of 50% glucose was administered through it. This meant an average of 1·4 litres of fluid and 2800 calories a day. There was therefore no need for intragastric feeding. The patient was given cream by mouth as far as he could tolerate it and, when his serum-potassium level fell, strawberries. During his illness he felt comfortable and vomited on only four occasions. His blood-urea level continued to rise to its maximum of 459 mg. per 100 ml. on the 14th day, but by the 12th day his daily output of urine had increased to 1·5 litres, and by the 26th day his blood-urea level had fallen to 42 mg. per 100 ml., though he was still passing large quantities of dilute urine. His blood-pressure did not rise above 156/80 mm. Hg at any time. His hæmoglobin decreased to 8·6 g. per 100 ml. on the 16th day; so he was given iron. A close watch was kept on the serum-electrolyte levels, and additions to his intravenous fluid and oral intake were made when necessary. Fig. 4 shows that

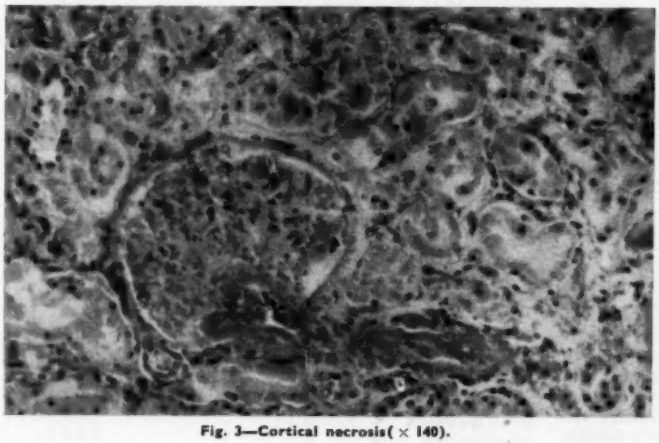

Fig. 3—Cortical necrosis(× 140).

there was never a great deviation from normal. In November, 1956, the blood-urea level was 34 mg. per 100 ml., but a urine concentration test did not produce urine above a specific gravity of 1·016. Further intravenous pyelography was not considered advisable.

Discussion

The renal damage must have been due to the aortogram, because cortical necrosis was already present in the kidney removed at operation. The nephrectomy prejudiced the patient by its effect on protein breakdown, and the blood-urea would probably not have risen so high otherwise, but the nephrectomy did not cause the renal damage.

The dose of contrast medium was well within the limits considered to be safe, and the patient gave no evidence of sensitivity to iodine. The needle punctured the aorta above the renal vessels, and no pressure was applied to the abdomen. The injection was made with a mechanical aid to injection, as is usual.

In every way the technique of the aortography was well within the limits regarded as safe. Alwall et al. (1955) collected eight cases of renal damage following aortography from the Scandinavian literature, and in all their cases the dosage was considerably higher than that given in the present case, except one case where injection was made into the renal artery. Riches (1955) had only one case of renal damage in 200 examinations, and then 60 ml. of 70% diodone was given in two injections.

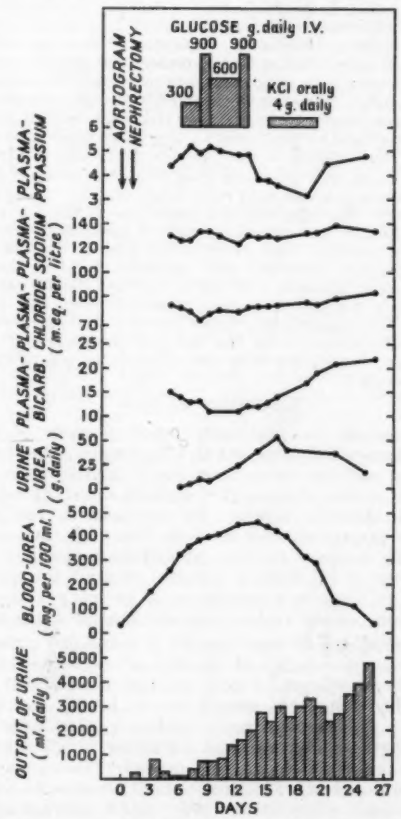

Fig. 4—Serum electrolyte and urea levels and urine output.

In the present case the non-functioning right kidney had a very reduced blood-supply; therefore probably the left kidney received a relatively higher dosage of the contrast medium. In the nephrographic phase the left kidney is very well shown (figs. 1 and 2), and it was remarked at the time that there was a risk of renal damage, though it was not expected to be so severe.

The nephrectomy, which was done the day after the aortography, provided a clear picture of the renal lesion caused by the injection of the organic iodide. In the Scandinavian published reports, where the histology has been taken from necropsy material, the lesion has been described as "tubular nephritis," but there can be little doubt that the sections in the present case show the damage in its pure form. Whether this necrosis is due to vascular spasm or is a direct toxic effect is not yet known.

The infusion of 50% glucose in water into the long saphenous vein was more satisfactory than anticipated, because we had been advised that we could achieve success only by passing the polythene tubing into the inferior vena cava. The infusion ran without any trouble for six and a half days, and it seems to be safer and easier than an infusion into the inferior vena cava.

Conclusions

Aortography is fairly safe but can cause renal damage; so it should only be used to gain information that cannot be obtained otherwise.

Where only one kidney is functioning it is advisable to reduce the dosage of the contrast medium.

After aortography any operation on the renal tract should be delayed for at least seven days to exclude renal damage.

Intravenous infusion of 50% glucose into a peripheral vein is possible, easy, and better than intragastric drip.

The renal damage is due to an acute cortical necrosis caused by injection of organic iodide.

Summary

A case is described in which severe renal damage followed aortography to elucidate the nature of a renal lesion.

I thank Mr. D. C. Corry for permission to publish and for his advice; Dr. A. S. Bligh and Dr. R. W. Cox for help in the preparation of the article; and Dr. W. H. Taylor and Mr. G. Higgins for holding the scales of the biochemical balance.

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A CASE OF RENAL FAILURE FOLLOWING RENAL ANGIOGRAPHY

K. M. DORMANDY
M.B. Lond., M.R.C.P.
LATE ASSISTANT MEDICAL UNIT
A. M. JOEKES
M.A., B.M. Oxfd, M.R.C.P.
RESEARCH ASSISTANT
D. SUTTON
M.D. Manc., M.R.C.P., F.F.R.
CONSULTANT RADIOLOGIST
ST. MARY'S HOSPITAL, LONDON

With illustrations on plate

ABDOMINAL aortography was introduced in 1929 by Dos Santos and his colleagues, and the demonstration of renal lesions by this method has in recent years been widely advocated and practised; but only during the past ten years has renal angiography come to be generally regarded as safe and acceptable.

This paper records a case of temporary renal failure following renal angiography. This is the first such case in a series of some 500 aortograms performed in the diagnostic X-ray department of St. Mary's Hospital in the past five years. 37 cases of various renal complications have been reported since the introduction of organic iodides as contrast medium. Most are listed in the reports of Idbohrn (1956) and McAfee and Willson (1956), but others have been reported by Dos Santos (1955), Barnes et al. (1955), and Hare (1957).

Of the 37 cases, the renal complications proved fatal in 7; 6 of these fatal cases had tubular necrosis, and no histological detail is given of the 7th. In 2 there was pre-existing pyelonephritis. 1 patient died with acute tubular necrosis as a result of hypotension following hæmorrhage from the aortic puncture. Another fatal case (Alwall et al. 1955) followed unilateral nephrectomy three days after renal angiography; but there was no good evidence to incriminate the previous renal angiography, and it is therefore not included in these figures. 21 patients had acute renal failure following the procedure, with oliguria lasting up to fifteen days but with subsequent recovery.

Case-report

A woman, aged 42, was admitted to St. Mary's Hospital last year under the care of Prof. G. W. Pickering. She was known to have had high blood-pressure since the age of 25, when she had attended her general practitioner on account of severe headaches. When she was 34, bilateral sympathectomy was done, with improvement of symptoms and temporary lowering of the blood-pressure. By 1954, however, the blood-pressure had risen to 230/145 mm. Hg; by May, 1956, it was 190/150, and she was given reserpine. There was no past history suggesting renal disease. She had never passed gravel or stones in the urine. Before sympathectomy, she had been unable to sit through a cinema performance without going out to pass moderate amounts of urine at least twice, and had to get up at least once a night to pass urine. After sympathectomy, there was no frequency of micturition. She was admitted to hospital for renal investigation to exclude any secondary cause for the high blood-pressure.

Examination.—The blood-pressure ranged from 170/100 to 190/150. There were no signs of cardiac failure and no retinal hæmorrhages or exudates. The kidneys were not palpable.

Investigations.—Intravenous pyelogram (I.V.P.) normal; excretion equal by both kidneys. Urine: a trace of protein; normal deposit; sterile culture. Blood-urea: 48 mg. per 100 ml.

A renal aortogram was performed on July 10, 1956, and is described in detail below. Next day, the temperature went up to 100°F, and she passed only small amounts of urine morning and evening. The urine deposit contained many pigmented granular casts and red cells. Next day, urine excretion was down to 11 ml. per hour. The specific gravity of the 200 ml. passed in the twenty-four hours was 1014. Both kidneys were easily palpable and tender. All food was stopped and 40% glucose solution was given by intragastric drip with added vitamins.

Progress.—Fig. 1 shows the total fluid intake and output and blood-urea until the patient recovered. The temperature returned to normal by the fifth day, and the kidneys were less tender though still palpable. On the eighth day an extra waterload of 800 ml. was given and was excreted normally, 100% being excreted in four hours. The kidneys gradually became smaller and were no longer palpable when she was discharged from hospital.

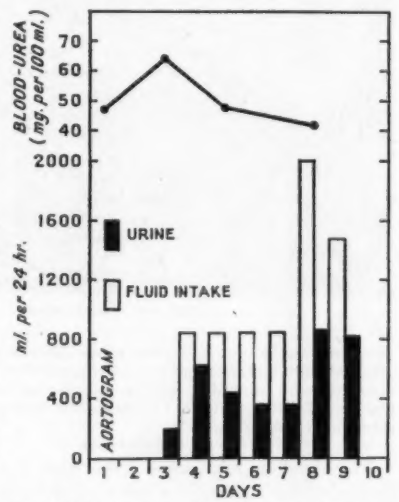

Fig. 1.—Fluid intake and output, and changes in blood-urea level.

Renal Angiogram.—After premedication with 'Omnopon' gr. 1/3 the investigation was carried out by one of us (D. S.) under local anæsthesia by percutaneous transfemoral catheterisation, using Seldinger's technique (Seldinger 1953). After a preliminary test dose of 5 ml. of 70% diodone, 30 ml. of 70% sodium acetrizoate ('Diaginol') was injected and serial films were taken. Unfortunately the patient breathed slightly during the exposures and a second injection was therefore made, this time of 25 ml. of 70% sodium acetrizoate. These three injections constituted the total dose of contrast medium received by the patient; they were made at intervals of about ten minutes to allow for the processing of films.

The films showed unusually good filling of the renal arteries and particularly of the right renal artery (fig. 3). An accessory renal artery was supplying the lower pole of the left kidney. The left kidney was excreting contrast medium in good concentration into the renal pelvis at the time of the last aortogram injection, whereas little evidence of excretion was noted on the right side. At the I.V.P. done some days previously, both kidneys had been excreting well and equally (fig. 2). This suggests that there had been immediate damage to the right kidney after the first injection, but not to the left kidney, though the later clinical evidence was of bilateral renal damage.

Limitation of Dose

In most of the previously reported cases of severe renal damage following renal aortography, the doses of contrast medium have been much higher than those used in this case, 40 ml. of 70% diodone at a single injection being a common figure. In addition, a mechanical pressure apparatus was used in many of the cases to inject the contrast medium at sufficient pressure. This had led us at St. Mary's Hospital to limit the quantity of drug injected to a maximum of 30 ml. per injection, and to use manual rather than mechanical methods.

This first case of renal failure in some 500 abdominal aortograms is considered worthy of recording because, although the danger of renal damage is now well recognised, this is only the second case to be reported in this country, and because renal aortography is now being increasingly widely practised. Further, this patient had good renal function as evidenced by the intravenous pyelogram and other clinical tests; the dose of contrast medium used was relatively low; and it was not injected at excessive pressure. As a result of this experience, we

have now reduced the dose per injection to a maximum of 20 ml. of 70% diodone or 70% sodium acetrizoate whenever a high proportion of the test dose enters the renal arteries. Only in exceptional cases, and where renal function is good, are second injections now made, and the maximum dose is then cut down to 15 ml. We are also using lower concentrations of contrast media by mixing them in various proportions with the newer less toxic media such as ' Urografin ' 60 or ' Hypaque 45.'

Summary

Temporary renal failure following renal aortography in a woman of 42. This is the second case to be recorded in this country.

Our thanks are due to Prof. G. W. Pickering for permission to use and publish the records of this case.

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RUPTURE OF THE DIAPHRAGM
A CASE-REPORT

E. J. WRIGLEY
M.B. Lond.
CASUALTY OFFICER, GENERAL HOSPITAL, KETTERING

With illustration on plate

RUPTURE of the diaphragm may be caused by crushing injuries of chest or abdomen, penetrating wounds, subphrenic abscess, or tube-drainage of an empyema. Rupture due to a crushing injury (Reid 1945, Carter et al. 1951, Chamberlain and Ford 1953, Bugden et al. 1955, Schneider 1956) is often the result of a car accident (as in the case recorded here)—a pedestrian is hit by an oncoming car, or a driver crushed against the steering-wheel.

Most ruptures are through the left leaf of the diaphragm, the right being protected by the liver. Usually the rupture starts near the œsophageal hiatus, and extends across the cupola to the costal margin. If the rupture is small the defect may be plugged by a piece of omentum, which normally suffices unless there is a further crushing injury. If the rupture is large there is free communication between the pleural and peritoneal sacs, and the abdominal viscera often pass into the pleural sac.

The immediate signs include: bruising of the left chest or upper abdomen; impairment of respiratory movements; tenderness in the epigastrium, the left hypochondrium, and the chest wall; mediastinal displacement; abnormalities of percussion and auscultation of the chest; and occasionally bowel sounds heard through the chest wall. A striking and constant feature is the very low blood-pressure without a rise in the pulse-rate. A chest radiograph shows absence of the diaphragmatic shadow, partial collapse of the left lung, and a pneumothorax, together with abnormal shadows of gas, fluid, and abdominal viscera. A barium swallow may confirm the diagnosis. At a later stage, there may be a history of intermittent colicky pain in the left epigastrium and chest, with vomiting and altered bowel habits; occasionally acute intestinal obstruction supervenes. The signs are similar to those of the acute case, without the profound hypotension.

The results of operation in uncomplicated cases are good. At a later stage, however, difficulties may be caused by fibrosis of the ruptured edges of the diaphragm and their contracture. It may then be necessary to paralyse the phrenic nerve or resect a rib during the repair.

Case-report

An intoxicated labourer, aged 54, was knocked down by a car. When seen in the casualty department, he was pale and cold, with a pulse-rate of 99 per min. and a blood-pressure of 75/40 mm. Hg. There were abrasions of the face, an unstable fracture of the right tibia and fibula, and slight bruising of the left anterolateral chest wall and abdomen (about 6 × 4 in.). The central nervous system seemed normal.

Respiratory system.—Normal movements; trachea central; normal apex beat. Percussion note (with the patient held in the sitting position) dull at the left base, and breath sounds absent. Anteriorly (with the patient supine) the percussion note was normal, but there was a small area of bronchial breath sounds to the left of the sternum.

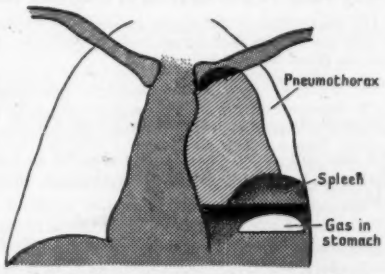

Fig 2.—An interpretation of the X-ray findings.

Abdomen.—Normal respiratory movements; slight epigastric tenderness and rigidity, maximal to the left; no palpable masses or liver; liver dullness present.

No firm diagnosis was made but a left hæmothorax and ruptured spleen were possibilities.

A radiograph of the chest was hard to interpret (fig. 1). In the light of subsequent findings, fig. 2 seems to be the correct interpretation.

Treatment and Course

An intravenous transfusion was started with plasma, and continued with blood. After two hours' transfusion and treatment for shock the patient's general condition showed no improvement.

A general anæsthetic (cyclopropane, oxygen, and gallamine triethiodide) was given by Dr. M. Lawrence. The right leg was set in a plaster-of-paris splint. A catheter was passed, and much clear urine withdrawn. The left chest was aspirated through the eighth costal interspace in the posterior axillary line, but no fluid was found. A laparotomy was performed through an upper left paramedian incision, and the diaphragmatic rupture discovered. Extension of the laparotomy incision showed that there was an 8-in. tear through the left dome of the diaphragm, starting near the œsophageal hiatus and passing forwards towards the costal attachment. Inside the pleural cavity were the stomach (distended with beer), several loops of intestine, some omentum, the ruptured spleen, and about a pint of blood.

Before the stomach could be drawn out of the pleural cavity it had to be aspirated. Attempted manipulation of the stomach before aspiration induced severe shock. In the second stage of the operation, the spleen was removed. Lastly, the diaphragm was repaired with interrupted through-and-through sutures. At the end of the operation the patient's condition was much improved, and the blood-pressure was 150/90.

The patient was conscious on leaving the theatre, but half an hour later lapsed into coma. By the evening petechiæ had appeared over the chest, neck, face, and conjunctivæ. Fat embolism was diagnosed. He never recovered consciousness, and died on the third postoperative day.

Necropsy (Dr. R. Sladden) confirmed fat embolism as the cause of death, and showed that the diaphragm was viable. There was no fracture of the ribs.

This story may help others to diagnose this condition, which may become less rare if, as seems likely, road accidents continue to increase in number.

My thanks are due to Mr. F. Radcliffe and Mr. T. H. Cullen for permission to report this case, and for their help and encouragement in preparing this article.

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SEX CHROMOSOMES AND HUMAN SEXUAL DEVELOPMENT

MATHILDE DANON Ph.D. Geneva
LEO SACHS Ph.D. Camb.

From the Department of Experimental Biology, Weizmann Institute of Science, Rehovoth, Israel

INTEREST in human intersexes has been revived by the cytological diagnosis of the sex chromosomes in non-dividing somatic nuclei.

The value of this method of diagnosis resides in :

(1) Its technical simplicity in contrast to the earlier studies of the sex chromosomes at meiosis (Greene et al. 1953) and mitosis (Hsu et al. 1953).

(2) Its diagnostic value in certain clinical conditions.

(3) Its contribution to the assessment of the effect of genetic constitution on the human sexual phenotype.

We deal here with these three aspects and the conclusions that can be drawn from the evidence that has accumulated.

The Method

As first devised by Moore et al. (1953) this method of diagnosing sex consists in counting, in a biopsy specimen of skin, the percentage of nuclei with an obvious spot of condensed chromatin (a chromocentre) often located at the nuclear membrane. Female skin shows about 70% of nuclei with this chromocentre and male skin about 5%.

Many other human tissues present the same sex difference (Moore and Barr 1954) : including oral mucosa (Marberger et al. 1955, Moore and Barr 1955), vaginal and urethral mucosa (Carpentier et al. 1956), and cells shed into the amniotic fluid by the fœtus (Serr et al. 1955, Sachs et al. 1956, Dewhurst 1956, Fuchs and Riis 1956, James 1956, Makowski et al. 1956, Shettles 1956).

Davidson and Robertson Smith (1954) showed that the sex could be determined in blood smears from the percentage of polymorphonuclear leucocytes bearing a characteristic nuclear projection.

In the hope of detecting among human intersexes those cases caused by abnormal sex-chromosome constitution, we recorded, in our investigation of skin, not only the proportion of nuclei with no chromocentre, or with one, but also the proportion of nuclei with two and with three chromocentres.

Our study of the somatic tissues of the field vole *Microtus agrestis*, which has exceptionally large sex chromosomes, showed clearly that both the X and the Y sex chromosomes could form distinct chromocentres. We therefore assumed that both types of chromocentres were to be found in human skin also. A finding of abnormal proportions of nuclei with two or three chromocentres should therefore indicate an abnormal number of sex chromosomes (Sachs and Danon 1956).

That the nuclear morphology of somatic cells does in fact reliably indicate the sex-chromosome constitution is shown by two kinds of evidence. First it has consistently indicated the sex correctly when applied to normal organisms. Secondly the sexual differences in number and aspect of the chromocentres can be directly related to the difference in sex-chromosome constitution for the following reasons :

(*a*) Sex chromosomes can form chromocentres, when the other chromosomes (autosomes) do not.

(*b*) In *Microtus agrestis*, whose sex chromosomes are very large in comparison with its autosomes, the somatic nuclei have proportionally enlarged chromocentres.

(c) Most conclusive of all, cases cytologically diagnosed as males may display recessive sex-linked hereditary characters—e.g., colour-blindness (Polani et al. 1956), and the Duchenne type of muscular dystrophy (Walton 1956)—which fact is an indisputable confirmation of their having only one X chromosome and of the reliability of the diagnosis.

We think that, on the present evidence, the cytological diagnosis of sex should be regarded as reliable : the finding of spermatogenesis in persons with the female type of somatic nuclei (Bunge and Bradbury 1956) is not in our opinion sufficient reason for doubting its reliability. As Bishop et al. (1956) have suggested, it is highly desirable to investigate cases of Klinefelter's syndrome with the female type of somatic nuclei to establish also for these cases genetical support for their sex-chromosome constitution.

Practical Value of Cytological Test

Because of its simplicity the test can be applied to many species in many conditions. In man its result already forms part of the clinical description of certain conditions, and it has become a valuable diagnostic tool in the following circumstances :

(1) Routinely used at birth in families containing known cases of adrenogenital syndrome it brings to light masculinisation of newborn females, thus enabling treatment with cortisone to be instituted even in the absence, common immediately after birth, of a high rate of excretion of 17-ketosteroids. The test is in any case easier to use than that involving either 17-ketosteroids or pregnanetriol (Zondek and Finkelstein 1954, Wilkins et al. 1955).

(2) In cases where the patient's appearance suggests gonadal agenesis the finding of the male type of somatic nuclei establishes both diagnosis and prognosis and makes exploratory laparotomy unnecessary. (The finding of the female type of somatic nuclei does not exclude the possibility of gonadal agenesis.)

(3) In male hypogonadism the finding of the female type of somatic nuclei makes possible the early diagnosis of Klinefelter's syndrome, even in the absence of increased urinary excretion of gonadotrophins or of other signs—e.g., gynæcomastia and feminine distribution of hair—which are absent in the prepuberal period (Nelson 1956). Testicular biopsy may thus be avoided and prognosis established.

(4) In normal-looking females with a small clitoris (who often come for medical advice and are examined for inguinal hernia) one can diagnose the "testicular feminisation" syndrome of Morris (1953) if the test on somatic nuclei contradicts the female phenotype. Such a diagnosis would make laparotomy and gonadal biopsy unnecessary.

(5) Applied to fœtal cells in amniotic fluid from pregnant women heterozygous for a sex-linked hereditary disease (Sachs et al. 1956) the test indicates the sex of the fœtus and thus whether the child will be free from the hereditary abnormality or has a one-in-two chance of manifesting it.

Theoretical Value of Cytological Test

BASIC PREMISES

Genetic Mechanism of Determination of Normal Sex

Considered as a set of anatomical and physiological characteristics, sex is determined by genetic factors. The localisation, number, and action of genetic factors of sexual differentiation have been studied experimentally in the fruit-fly *Drosophila melanogaster* (Snyder 1951, Srb and Owen 1953). Genes for male sex (M) and for female sex (F) were found in both sexes, and the sexual phenotype was found to depend on the preponderance of one or other of these genes. The unequal distribution of sex genes is produced by the unequal distribution of sex chromosomes.

In species in which the rule is for male and female gonads to be borne by separate individuals the sex genes of one type are concentrated in the sex chromosomes. Thus, in drosophila the F genes are located in the X chromosomes. The F genes of two X chromosomes overcome the masculinising action of the M genes located in the two sets of autosomes and, in the fertilised egg

cell, will direct development towards the female phenotype. If only one X chromosome is present, the action of its F genes is overcome by the masculinising action of the autosomal M genes and the organism will develop towards the male phenotype. It is not the absolute amount of sex genes of one kind but the ratio of F/M genes that determines the sexual phenotype. The Y chromosome in the male drosophila does not carry any sex genes.

This mechanism works well in all species with sex genes of uniform strength throughout all members of the population. The XY and XX chromosome combinations, even in inter-racial hybrids, will then produce normal male and female phenotypes respectively.

Intersex due to Special Properties of Genes

Goldschmidt (1939) showed that geographical races of lymantria (a tussock moth) might have sex genes of different strengths. Thus, for example, in inter-racial hybrids the strong genes of one sex chromosome are not completely overridden by two sets of weaker antagonistic autosomal genes, and this gives rise to intersex determined by the particular properties of the genes in individuals with normal sex-chromosome constitution. In the races of lymantria many such genes are involved.

A single gene, however, may also upset the chromosomal mechanism of sex determination. Sturtevant (1945) described, in drosophila, an autosomal recessive mutant which, in the homozygous state, transformed otherwise genetically normal females into phenotypical males. This mutant behaves as a very strong masculinising factor which can, by itself, overcome all the F genes of the two X chromosomes. Such transformed flies are cases of gene-induced reversal of sex due to the action of a single homozygous gene.

Intersex due to Abnormal Number of Sex Chromosomes

In a homogeneous population with efficient mechanism for sex determination intersex due to genetic factors may be expected to result (apart from such a rare event as a mutation of the type described by Sturtevant) from an abnormal distribution of sex chromosomes. This was found in drosophila by Bridges (1939), who produced flies with different ratios of X chromosomes and autosomes. Flies with more than one X chromosome per two sets of autosomes (the ratio characteristic of the normal male) and less than two X chromosomes per two sets of autosomes (the ratio characteristic of the normal female) were intersexes with, for example, XX chromosomes per three sets of autosomes.

The laws established by Bridges for drosophila also seem to be valid for lower vertebrates (Ponse 1949), in which haploid and polyploid individuals may be produced experimentally.

In mammals similar experiments cannot be made, because of technical difficulties; but one may extend these conclusions to them because many of them, including man, show clearly one pair of sex chromosomes, the female having the homozygous formula XX and the male the heterozygous formula XY. They have the same chromosomal mechanism of sex determination as drosophila. Differences could exist, however, in the number and location of the sex genes. For example, we do not know if, in mammals, the Y chromosome also has no sex genes.

Intersex due to Endocrine Factors

In all vertebrates the influence of the genetic factors in sexual development is hidden by the important rôle of the endocrine system, especially the gonadal and adrenocortical steroid hormones. It is well known that any disturbance of the endocrine system affecting the secretion of gonadal and cortical hormones, and happening before the genital organs are completely determined, produces anatomical intersex. The size of the phallus, the distribution of hair, the development of the breasts, and the pitch of the voice in man are throughout life modifiable by endocrine imbalance. Endocrine dysfunction itself may be induced by external factors or by genetical factors acting on the endocrine system.

Summary

We may therefore theoretically assume for man three sets of causal factors for intersexuality:

(1) *Genes*, presumably single gene mutations (since inter-racial crosses in man have not been shown to produce intersexes).

(2) *Abnormal distribution of sex chromosomes* (XXY, XO, &c.).

(3) *Endocrine dysfunction* induced by external factors or by genetic factors affecting the endocrine system.

Up to now it has been impossible to assess the rôle and importance of genetic factors in normal and pathological mammalian sexual development. In contrast to this, the proved effectiveness of the epigenetic factors, the endocrine ones, in shaping the sexual phenotype of genetically normal individuals has perhaps led to overemphasis of their causal importance in the appearance of all intersexes.

The cytological method of diagnosing the sex-chromosome constitution now allows us to substitute for some of the missing genetic experimental data cases taken from the wide range of natural experiments offered by human pathology.

THE EVIDENCE

In reviewing the evidence on the sex chromosomes of human intersexes we include under the broad heading of "intersexes" individuals whose anatomical features (even if only secondary sex characters) either belong to both sexes or display exterior hypogenitalism. This is justified by the results given by the diagnosis of the sex chromosomes in some of these individuals who were clinically not intersexes; we group them here either according to the histological structure of their gonads or as "gonadal agenesis."

True Hermaphrodites

Very rarely both male and female gonadal structures are present in the same person either as separate organs, or in the same gonad as an ovotestis. Of 13 such true hermaphrodites whose skin nuclear chromatin was studied (Hinglais and Hinglais 1955, Barr 1956, Nelson 1956) 8 were interpreted as having XX chromosomes and 5 as having XY. Bilateral biopsy specimens gave the same results on both sides of the body (Bromwich 1955, Barr 1956).

According to theories of sex differentiation which assume that gonadal differentiation is directly determined by the sex-chromosome constitution true hermaphrodites are chimeras of male and female cells inducing male and female gonads in one individual. Bilateral similar chromatin patterns have so far not confirmed this explanation. One person, in whom an asymmetrical group of sex chromosomes was found in a meiosis of the testis and a female type of chromatin pattern in the skin, was tentatively interpreted as having the XXY formula (Greene et al. 1954). This interpretation, however, does not make it any clearer why, in the same organism, two gonads of different sex have developed to a functional state.

Male Pseudohermaphrodites

These include all testes-bearing intersexes, whether their external appearance is almost completely masculine or almost completely feminine. All the male pseudohermaphrodites whose skin chromatin pattern has been published (Hinglais and Hinglais 1955, Barr 1956, Nelson 1956) were regarded as having the XY sex-chromosome constitution; but in the recently discovered cases of

Klinefelter's syndrome,[1] a female type of chromatin pattern was found by Bradbury et al. (1956), Grumbach et al. (1956), Jackson et al. (1956), Nelson (1956), Plunkett and Barr (1956a and b), Riis et al. (1956), and Witschi et al. (1956),

Among the 13 male pseudohermaphrodites that we have analysed (Danon 1957) by a detailed count of nuclei with one, two, and three chromocentres, we distinguished three groups, which appeared to be separated by their clinical features as well as by their chromatin patterns in the skin :

(1) Male pseudohermaphrodites with variable internal anatomical build, but exteriorly resembling hypoplastic males : their chromosomal formula appeared to be XY.

(2) Primary male hypogonadism (clinically Klinefelter's syndrome), whose chromosomal formula appeared to be XX.

(3) Cases described by Morris (1953) as " testicular feminisation syndrome,"[2] their main feature being the possession of active testes and a completely feminine external appearance. In the 2 cases of this type that we examined in detail (we did not then know that they belonged to the same clinical group) we found that they definitely had neither the XX nor the XY formula, because we found a large excess, for males, of cells having one or two chromocentres and an excess, for both males and females, of cells having three chromocentres. We concluded that these numbers of chromocentres could be explained by an XXY formula. This explanation is compatible with the mode of heredity shown by the study of pedigrees.

Female Pseudohermaphrodites

These intersexes bear ovaries and are divisible into two groups:

(1) *With adrenal hyperplasia.*—These represent cases of the congenital adrenogenital syndrome in females, particularly studied by Wilkins et al. (1955a and b). They form as many as half of all the cases of human intersexuality (Wilkins et al. 1955b). The hereditary causal factor induces hyperplasia and abnormal steroid metabolism in the adrenal cortex, whose products then have a strong androgenic action on sexual development and depress the pituitary gland, causing secondarily aplasia of the ovary. The sex-chromosome formula in 103 such cases (Hinglais and Hinglais 1955, Barr 1956, Nelson 1956, Danon 1957) was XX, as could be expected from the known pathogenic mechanism.

(2) *Without adrenal hyperplasia.*—Of these rare cases of female pseudohermaphroditism (Wilkins et al. 1955b) only 3 were studied for their sex-chromosome formula, which was found to be XX (Hinglais and Hinglais 1955, Barr 1956, Danon 1957).

Gonadal Agenesis

Some short, sexually infantile-looking women, with primary amenorrhœa and underdeveloped internal female organs, have no gonads. Various anomalies may be associated with the absence of the gonads, producing the characteristic Turner (1938) syndrome. Klotz et al. (1956) have described three families containing sisters with gonadal agenesis.

Up to now the sex-chromosome constitutions of 198 persons with gonadal agenesis have been reported (Lennox 1956, Danon 1957, Nelson 1956), 36 having the female pattern and 162 the male.

Jost (1950) and Wilkins (1950) predicted that these female-looking individuals must include " genetic males." This prediction was based on the results of experimental castration of embryo rabbits by surgery (Jost 1947) and mice by X rays (Raynaud and Frilley 1947). These workers found that very early castrated embryos were always born with normal female phenotype. The absence of testes deprives the developing embryo of a secretion necessary to produce the male phenotype. The " neutral " phenotype corresponds, in mammals, to the female phenotype, which therefore does not require any essential secretion from the ovary for its production.

The cytological diagnosis of sex has shown that these conclusions can also be applied to man, in whom the male phenotype has, so far as we know, never developed in the absence of a gonad. The cytological diagnosis has, however, also uncovered unexpected facts about gonadal agenesis. 2 such persons presenting no clinical peculiarities (Hauser et al., cases H. L. and K. H., 1956) had, in their skin epithelium, patches of cells with the female chromatin pattern and patches with the male chromatin pattern. In 1 of them repeated bilateral biopsies gave different results according to the side, whereas in the other person groups of cells with different sex-chromosome constitution were found in the same biopsy specimen. These findings were checked in two different laboratories including ours. For genetic reasons (see below) we think that in these " mosaics " the cells with the male chromatin pattern are more likely to have the constitution XO.

THE INTERPRETATION

Table I shows the sex-chromosome constitutions found in human intersexes. It will be seen that the true hermaphrodites are not homogeneous ; that the testes-bearing intersexes form three genetically and clinically distinct groups ; that the ovary-bearing intersexes all have the XX formula although belonging to at least two clinically distinct types ; and that the cases of gonadal agenesis present various sex-chromosome constitutions.

These findings clearly show that the completely differentiated gonad does not strictly correspond to the sex-chromosome constitution. It is therefore inadequate to use the gonad as the fundamental sexual characteristic on which to base a logical classification of intersexes.

The use of the sex-chromosome constitution as the criterion of sexuality and as a new basis for the classification of intersexes is justified by the clues which such a classification offers to the pathogenic relations of the different types (table II). Inside the two main groups, XX

TABLE I—CLASSIFICATION OF HUMAN INTERSEXES BASED ON GONADS

Type of intersex	Gonads	Sex chromosomes
True hermaphrodites ..	Ovary and testes or ovotestis	XY, XX
Male pseudohermaphrodites :		
Simulating males (including Klinefelter's syndrome)	Testes	XY, XX
Simulating females (testicular feminisation syndrome)	Testes	Probably XXY
Female pseudohermaphrodites :		
With adrenal hyperplasia	Ovaries	XX
Without adrenal hyperplasia	Ovaries	XX
Gonadal agenesis	..	XY or XO, XX Mosaics

1. This syndrome was first described by Klinefelter et al. (1942) and subsequently studied by Nelson and Heller (1945) and Heller and Nelson (1945). It is found in variably eunuchoidal males, who often have bilateral gynæcomastia and feminine distribution of hair. The testes are small ; there is little or no germinal epithelium ; but normal Sertoli cells are present in the tubules, unless these are completely obliterated by progressive hyalinisation of the membranes. Leydig cells are clumped in dense masses, having normal functional appearance. Their number, if the reduced size of the testis is taken into account, is about normal. The urinary excretion of 17-ketosteroids is normal or subnormal. The urinary excretion of gonadotrophins is usually high, reaching castrate levels. The onset is prepuberal, of unknown origin.
2. This syndrome (Morris 1953) is found in normal-looking women, with feminine body-build and well-developed breasts. After puberty pubic and axillary hair is characteristically absent or very scanty. The vulva is always hypoplastic, with normal or small clitoris, the vagina usually short, ending blindly, and the uterus is absent, which fact causes primary amenorrhœa. The gonads are bilateral, abdominal or labial cryptorchid testes-like. Both androgens and œstrogens are secreted at normal levels by the gonads, whose surgical removal causes striking symptoms of female menopause. Urinary gonadotrophins are usually at high levels. This syndrome has a well-recognised familial incidence.

TABLE II—CLASSIFICATION OF HUMAN INTERSEXES BASED ON SEX-CHROMOSOME CONSTITUTION

With normal sex-chromosome constitution

Degree of reversal of sex	XY	XX
Complete ..	Gonadal agenesis	Klinefelter's syndrome
With features of both sexes	Male pseudohermaphrodites and some true hermaphrodites	Female pseudohermaphrodites with and without adrenal hyperplasia and some true hermaphrodites

With abnormal sex-chromosome constitution

Mosaics and probably XO	Probably XXY
Gonadal agenesis	Testicular feminisation syndrome

and XY, the different clinical types may be placed according to their relative discrepancy from the phenotype to be expected from their sex-chromosome formula. Once this is established, animal genetics and the modern fœtal endocrinology offer enough experimental analogies to allow us to obtain a much clearer insight into the possible ætiology and pathogenesis of many cases of human intersex.

XY Cases

Among the organisms having the XY formula the extreme cases of reversal of the phenotypical sex are provided by gonadal agenesis with female-looking "neutral phenotype." All other cases, whatever their anatomical peculiarities, may be explained on the basis of Jost's and similar experiments—i.e., through failures of either the embryonic or the fœtal testis. The consequences of such a failure differ according to the moment in development when the failure occurs, to its permanent or transitory nature, and to its quantitative importance—e.g., embryonic secretions may be efficient enough to maintain and stimulate the wolffian ducts but insufficient to induce regression of the müllerian ducts. At the end of fœtal life testicular failure would cause only slight exterior malformations—e.g., incomplete fusion of the perineal folds, producing simple hypospadias (Jost 1953).

XX Cases

Among the organisms having the XX formula extreme reversal of sex is shown in Klinefelter's syndrome, which is obviously brought about by a completely different mechanism from the reversal of sexual phenotype from male to female. No endocrine mechanism has yet been suggested as a possible cause of Klinefelter's syndrome; the data contradict the assumption of a direct correlation between sex-chromosome constitution and the type of gonads. One could suggest an intermediate agent—e.g., the pituitary gland—between the action of the sex chromosomes and the gonadal differentiation, but this hypothetical intermediate agent would have to act extremely precociously, and we have no experimental evidence of its existence.

The cause of Klinefelter's syndrome might reside in the genetical constitution; indeed familial incidence of the syndrome has been reported (Reifenstein 1947, Sohval and Soffer 1953, Nelson 1956). Moreover familial cases of male hypogonadism associated with gynæcomastia and sterility have often been published and might well include cases of Klinefelter's syndrome.

The pituitary gland in Klinefelter's syndrome is strikingly insensitive to the appreciable doses of androgens secreted by the normal Leydig cells of the testes; androgens are at normal or subnormal levels and urinary gonadotrophins most often at castrate levels. If we try to seek a parallel to these human cases among animals, we find that they are most like the type of reversal of sex observed by Sturtevant (1945) in drosophila: complete reversal from female sex-chromosome constitution to complete male phenotype, including structure of the gonads and differentiation of germ cells, the testes being in both cases small and the sterility complete. The reversal is due to a genic factor in the fly, and there also seems to be a genetic basis in man.

The type of anatomical and endocrine disorders found in the congenital adrenogenital syndrome in females, described as female pseudohermaphroditism with hyperplasia of the adrenal cortex, is now well understood since the cortical origin of the masculinisation was established (Wilkins et al. 1955a and b). It often starts in fœtal life, when the urogenital sinus is still ambivalent and can be differentiated towards the male type. Internal organs are not affected, because the activity of the adrenal cortex starts late in fœtal life, after their determination has become irreversible.

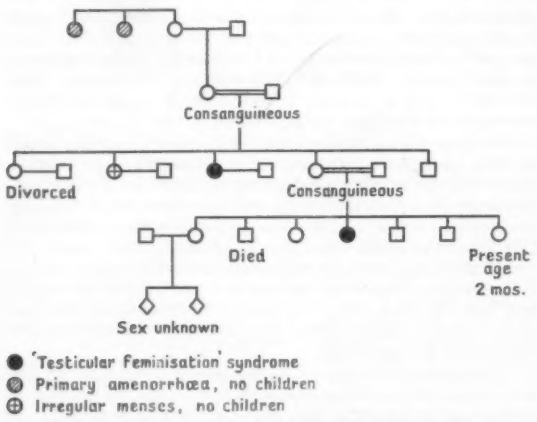
The much rarer cases of female pseudohermaphroditism not caused by adrenocortical dysfunctions are mostly of unknown ætiology. No genetic factor seems to be involved, and exterior masculinising actions must be presumed. 2 cases of masculinising arrhenoblastomas in pregnant women, which caused intersex in female fœtuses, have been reported (Brentnall 1945, Javert and Finn 1951). Disturbances of the metabolism of the mother, even if not of endocrine origin, might be involved (Jost 1957). A direct masculinising action of the embryonic ovary cannot be excluded (Ponse 1955).

The cases of gonadal agenesis with XX chromosomes have now to be excluded from the intersexes. They are cases of true "ovarian agenesis" producing, in the absence of gonads, the neutral phenotype, which in their case corresponds to the one expected from their sex-chromosome formula.

XXY Cases

The syndrome of "testicular feminisation" appears, for various reasons, to be a separate and well-defined entity. Anatomically people with this syndrome are distinct from the other types of male pseudohermaphrodites by the striking similarity among them of their body-build (in contrast to its variability in the other testes-bearing intersexes) and by their completely feminine appearance, except for slightly eunuchoidal skeletal proportions reported in some cases. Morris (1953) rightly emphasises that their clitoris is at most the size of that of a normal female and usually smaller. This again is in contrast with the other male pseudohermaphrodites, in whom, even when feminisation is extreme, the clitoris is still larger than normal for a female. The same applies to their characteristically scanty or absent body-hair. From the endocrinological point of view there is a paradox between their normal-looking Leydig cells, the normal male level of 17-ketosteroids, and the complete absence of masculinisation of the body. Œstrogen secretions (strikingly shown by the menopausal signs exhibited after surgical removal of the testes) at normal levels for females are also unable to bring about complete feminisation: the nipples are hypoplastic and poorly pigmented, the vulva is of prepuberal aspect, and there is no growth of sexual hair. Hair follicles are nevertheless present in normal density. Morris deduced from this sort of evidence that the œstrogens secreted by the testes must be qualitatively, if not quantitatively, abnormal. Nevertheless large doses of methyl testosterone do not induce growth of the body-hair (Wilkins 1950). The pituitary is also in these cases insensitive to gonadal secretions, and high levels of gonadotrophins are excreted in the urine.

This syndrome of intersex is the only one showing a constant familial incidence and a clear-cut mode of transmission. Sixteen complete pedigrees are known (Petterson and Bonnier 1937, Burgermeister 1953, and unpublished). A previously unpublished pedigree is



Pedigree with cases of testicular feminisation syndrome.

given in the accompanying figure. The condition is always inherited through the mother, and the sex ratio among siblings indicates an excess of phenotypical females (comprising the intersexes); the intersexes must therefore have a Y chromosome. The genetical factor is borne by the mother's X chromosome; it might be either a recessive gene or a supernumerary X (Petterson and Bonnier 1937, Burgermeister 1953, Taillard and Prader 1957). In the latter case the sexual anomaly would be due to an abnormal sex-chromosome constitution of the XXY type, the two Xs being either attached (as in drosophila) or not.

Detailed cytological analysis of our cases of this syndrome has shown that there is an excess of nuclei with three chromocentres in all their skin cells; this could be explained by the presence of a whole X chromosome in excess. We have unfortunately not yet been able to examine skin-biopsy specimens from the mothers of such patients; these mothers, if the intersex offspring are XXY, should be XXX, unless the abnormal XX ovules are due to an inherited type of abnormal meiosis in the mother (Taillard and Prader 1957). If the latter explanation is correct, the mother would be XX. One possible argument in favour of the former explanation is that cases have been reported in which the mother of such patients has no body-hair (Novak 1924, Perkins 1933, Schuttze 1930). One obviously should, in such cases, attempt to examine the complete chromosome set in mitotic plates.

Mosaics

These are the cases of gonadal agenesis showing mosaic patterns of somatic cells with two different sex-chromosome constitutions. Fertilisation of a binucleated egg by two different spermatozoa, or the loss at an early stage of morphogenesis of an X chromosome during an accidentally abnormal mitosis, could explain mosaics. The loss of an X chromosome could produce nuclei of different sex-chromosome constitution starting from one single female nucleus. It would parallel an observed similar phenomenon in drosophila, in which species it gives rise to gynandromorphic flies, part phenotypically female, part phenotypically male, according to the sex-chromosome constitution of the cells (Srb and Owen 1953). In man it could not be expected that gynandromorphism would appear in gonadal agenesis, because of the need of male hormones to differentiate male phenotypical traits.

The finding of mosaic organisms among cases of gonadal agenesis suggests that many such cases diagnosed as "males" or "females" were mosaics (whose peculiar constitution was not revealed by one single biopsy) and that the "males" were possibly XO. We have often noticed that cases of gonadal agenesis with apparently male chromatin pattern had fewer chromocentres in their skin than have normal males. If they are XO, the question arises whether there is any relation between the Y-chromosome deficiency and the clinical symptoms of gonadal agenesis and the often associated anomalies. Each of these symptoms may be present independently (Decourt et al. 1956, Caflish 1952); nevertheless simple gonadal agenesis is usually more common among persons found to be XX, and the complete Turner syndrome is very rare among them. Experimental embryonic castration in mammals does not produce any other anomaly than differentiation towards the female type. In view of the variety and variability in degree of expression of the different symptoms, a chromosomal deficiency appearing more or less early during development, and accordingly causing different degrees of aberrations, would explain these facts.

We feel that such explanations, although still speculative, have to be kept in mind in view of the facts disclosed by the diagnosis of sex chromosomes in gonadal agenesis. In these cases also a study of the whole chromosome complement would furnish valuable further information.

CONCLUSIONS

The facts brought to light by the cytological diagnosis of the sex chromosomes in man confirm Jost (1950) and Wilkins's (1950) suggestion that patients with gonadal agenesis must include some males; they disclose in man a complete reversal of sex from the female towards the male phenotype and not in the reverse direction; and they indicate probable anomalies in sex-chromosome constitution and the existence of real genetical mosaics.

In the light of these data, combined with genetical evidence from pedigrees, we may reconsider the actual occurrence and respective importance of the three possible causes of intersex in man: genic, chromosomal, and endocrine. It can be confirmed that most of the abnormalities in sexual development are due to failures of the endocrine system. These may be satisfactorily understood on the basis of evidence from experimental endocrinology. But we have also been able to recognise, in the syndrome of "testicular feminisation" and perhaps in some complicated cases of gonadal agenesis (Turner's syndrome), genetically induced types of intersex possibly caused by abnormal sex-chromosome constitution, and, in Klinefelter's syndrome, a gene-induced reversal of sex.

The action of genetic factors in sexual development can be further analysed by separating the different syndromes of intersex according to their cause. In doing this we notice first that endocrinologically induced intersex varies very widely from the slightest anomaly to the complete opposite phenotype (in testicular agenesis, and in extreme cases of the adrenogenital syndrome in females). In contrast to this are the two clearly defined syndromes of "testicular feminisation" and of Klinefelter, in which the patients present, in a striking homogeneous way, primary sex characters as well as other features (except, possibly, a variation in secondary sex characters in Klinefelter's syndrome).

The endocrinologically induced types of intersex (except for irreversibly fixed anatomical deviations) respond well to endocrine treatment, particularly the cases of female masculinisation in the adrenogenital syndrome. Treatment with cortisone (Wilkins et al. 1955a), which inhibits the output of androgens by the adrenal cortex, restores the normal female endocrine balance and facilitates female development.

In the endocrine cases the pituitary gland is either depressed or overactive according to the endocrine status. In contrast to this, the pituitary in genetically induced cases is paradoxically insensitive to the normal, or almost normal, androgens and œstrogens secreted by the gonads. Neither the organism as a whole nor the

individual target organs respond satisfactorily, even to normal hormone secretions: the "hairless women" are not masculinised and poorly feminised, and patients with Klinefelter's syndrome are usually poorly masculinised. Hormonal substitution therapy often cannot overcome this resistance, particularly in the testicular feminisation syndrome (Prader 1957).

In experimental endocrinology instances have been found of differential sensitivity between male and female homologous organs, even at an undifferentiated state, to the same dose of hormones (Padoa 1947, Ancel 1946, Greene et al. 1942): in the embryonic undifferentiated stage after castration a müllerian duct requires more testosterone to regress in a female than in a genetically male embryo. This sort of evidence shows that both sexes, although they can secrete the same hormones in the same quantities, are nevertheless fundamentally different because of their genetical constitution. This difference is not merely theoretical; it is, in the above-mentioned cases, patently shown by the differential sensitivity of their cells to certain levels of hormones. The rôle of genetic factors in sexual development could then be the one of determining the responsiveness of the soma to hormonal stimuli.

The apparently paradoxical features of hormonal resistance of the genetically induced cases of intersex in man fit well and support such an interpretation of the action of the genotype in sexual development: the response of their somatic tissues to hormones is changed, and this determines their condition completely, or at least more than their slightly abnormal hormonal secretions. The existence of Klinefelter's syndrome, which shows that testes can be differentiated in a chromosomal female, extends this concept of differential sensitivity even to the gonadal tissue, and in this case the differential sensitivity of the gonadal anlagen would have been upset by a genic factor.

It can therefore be concluded that the systematic analysis of human intersexes by the cytological diagnosis of the sex chromosomes, in combination with anatomical, endocrinological, and genetical evidence, has made possible a new approach to the study of normal and pathological human sexual development. It can also be seen that this approach has already proved to be of considerable value both from the clinical and the theoretical point of view.

We wish to thank Dr. E. Ehrenfeld for helping us to collect this pedigree.

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PARALYTIC POLIOMYELITIS IN A SPASTIC

H. J. GOLDSMITH *
M.D. Lond., M.R.C.P.
SENIOR MEDICAL REGISTRAR, LEICESTER ROYAL INFIRMARY

IN poliomyelitis, the factors influencing the severity and localisation of paralysis include accidental and surgical trauma, physical exertion, pregnancy, intramuscular injections, preventive inoculations, and vaccination. The amount of physical activity after the appearance of meningitic symptoms is known to affect the severity of subsequent paralysis (Russell 1947).

In the case of severe paralytic poliomyelitis here reported the severity and distribution of the paralysis were proportionate to the severity and distribution of a pre-existing spastic state. A similar case has been recorded by Apert et al. (1931).

Case-report

The patient was born blind. Details of his birth are unobtainable, but he remained cyanosed for some time. Severe spasticity of the legs was soon noted, but his intelligence was normal, and he talked from an early age. Though congenital bilateral cataracts were dealt with by a needling operation when he was 5 months old, he did not acquire visual fixation, and the combination of poor eyesight and indulgent parents resulted in his failing to learn to read and write. His right arm was later found to be slightly spastic also, though not enough to prevent him from teaching himself to play the piano. Through conversation with prisoners-of-war whom he met in his home town, he learned to speak German. Though he had difficulty in getting up from the sitting position, he taught

* Present address: Royal Infirmary, Sheffield, 6.

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himself to walk, during adolescence, by pushing a pram or an invalid chair.

Poliomyelitis.—At the age of 33 he had poliomyelitis. On the seventh day of his illness he was admitted to a fever hospital in a confused state, with urinary retention and severe paralysis of both legs. Lumbar puncture produced fluid containing protein 100 mg. per 100 ml. and 80 cells per c.mm., of which 90% were lymphocytes.

When I saw him on the ninth day of his illness he was coöperative and intelligent, with normal chewing, swallowing, coughing, and phonation. There were constant incoördinated roving movements of both eyes, of long standing. Apart from an increase of the jaw-jerk his cranial nerves were normal. His arms showed symmetrically increased reflexes, without obvious spasticity or weakness. His trunk showed absent superficial and deep reflexes, and his knee and ankle reflexes also were absent. A pinprick on the foot produced an extensor flicker of the big toe, whereas plantar stroking produced a flexor response. Voluntary movement in the legs was almost completely lost; but curiously enough there appeared to be some residual spasticity—a finding which Dr. Ritchie Russell, who kindly examined the records, regards as possibly due to shortening and tightening of the muscles. Sensation was normal everywhere, and the urinary bladder was palpable above the pubes. During the seventh week of his illness he was transferred to an orthopædic ward.

Progress.—He was re-examined fifteen months later, when bilateral arthrodesis of the ankle-joints had been performed

Patient's legs fifteen months after poliomyelitis.

and he was just beginning to walk on his own with the aid of two leg callipers and crutches. He had resumed playing the piano and was regularly accompanying for the Sunday services in the ward.

Examination of his cranial nerves showed no change. His arms showed symmetrically increased reflexes, with very slight spasticity limited to the right arm. Apart from a little right deltoid weakness, without apparent wasting, there was no other demonstrable lower-motor-neurone involvement of his upper limbs. The trunk showed slight wasting of the sacrospinalis muscle in its lower portion, with cephalad deviation of the umbilicus on active head flexion. The oblique abdominal muscles were fairly firm, but the psoas-iliacus muscles were greatly weakened. The deep abdominal reflexes were increased, and only the right lower superficial abdominal reflex was absent, as were both cremasteric reflexes. Both legs now showed profuse weakness and wasting with complete flaccidity, the knee, ankle, and plantar reflexes being absent. Sphincter control had returned to normal, and diaphragmatic movements were normal on radioscopy.

The accompanying figure shows the severe wasting of the leg muscles, the formerly more spastic right leg being the more severely affected.

Discussion

This patient was afflicted with congenital spasticity affecting his lower limbs severely and his right upper limb slightly. When he developed paralytic poliomyelitis, the neurones supplying the spastic limbs were the most affected, and only the spastic limbs developed flaccid paralysis.

Spasticity indicates excessive activity of the lower motor neurone, comparable perhaps to severe exertion in the normal. Possibly this heightened activity was to some extent responsible for the distribution and severity of the paralysis.

Many thanks are due to Dr. J. C. H. Mackenzie and Dr. L. Morris for permission to publish, and to Dr. L. Hahn and Dr. W. Ritchie Russell for helpful criticism.

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Preliminary Communication

MULTIPLE MYELOMATOSIS AND MACROGLOBULINÆMIA
DIFFERENTIATION BY STARCH-GEL ELECTROPHORESIS

MULTIPLE myelomatosis and macroglobulinæmia are hard to distinguish. The clinical features are not always clear-cut [1]; Bence Jones proteins may be present in the urine in both conditions [2]; the abnormal globulins in the serum cannot be distinguished by paper electrophoresis [1]; and the Sia water-test is unreliable.[3] The only conclusive evidence is an ultracentrifuge finding of significant amounts (more than 5%) of one or more proteins of high molecular weight, with sedimentation-constants, at zero concentration, greater than 15 S.[4] I have found, however, in two cases of myelomatosis and two of macroglobulinæmia, that though the abnormal serum-globulins had identical mobilities when subjected to paper-electrophoresis, their mobilities were strikingly different on a starch-gel supporting-medium.

Paper-electrophoresis of the sera was carried out essentially by the method of Flynn and De Mayo,[5] and showed in each case a sharp, strongly staining band, with the mobility of a slow γ-globulin (fig. 1). Starch-gel electrophoresis was carried out as described by Smithies,[6] using the filter-paper method of inserting the serum. When the electrophoresis was complete, the starch-gels were stained with naphthalene black. The myeloma sera showed a strong, intense band with the mobility of a slow γ-globulin, which was absent in the macroglobulin sera (fig. 2). On staining with naphthalene black, the papers used for inserting the myeloma sera showed only faint traces of protein remaining after electrophoresis (presumably due to a slight amount of adsorption and to the presence of proteins of such low mobility that they had remained at the starting-

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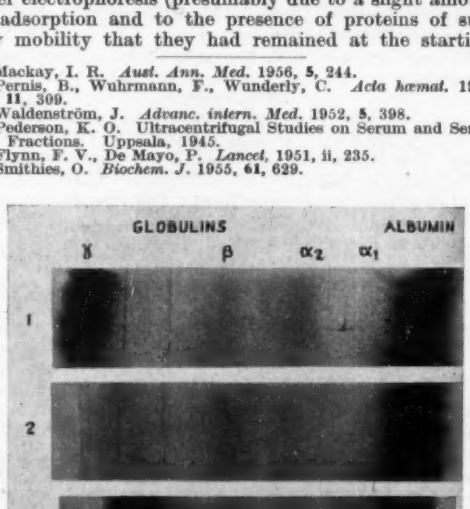

Fig. 1—Paper electrophoresis patterns of (1) myeloma serum (2) normal serum, (3) macroglobulin serum (case 2).

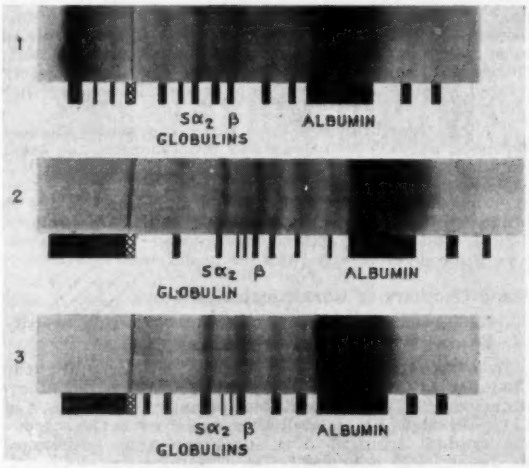

Fig. 2—Starch gel patterns of (1) myeloma serum, (2) normal serum, (3) macroglobulin serum (case 2).

The filter-paper method of sample insertion was used; the position of sample is indicated by cross-hatching. Nomenclature according to Smithies.

position). In contrast, the papers from the macroglobulin gels stained intensively, indicating that the macroglobulins were still in the paper at the point of insertion.

In the ultracentrifuge,* both myeloma globulins gave $S_{20,w}$ values of 5·8 S at a serum dilution of 1 : 4 in 0·2 *M* NaCl solution. At the same serum dilution, the values for the macroglobulins were $S_{20,w}$ = 15·3 S and 13·8 S. When examined over a serum-dilution range, the second macroglobulin serum gave an extrapolation figure at zero concentration of 18·5 S; an even higher figure would be expected with the first serum.[7] These findings suggest that the molecular weights of the macroglobulins are of the order of 1,000,000, and of the myeloma globulins about 150,000.

Difference in the size of the macroglobulin and myeloma-globulin molecules could account for their behaviour on starch-gel electrophoresis. But I found that β-liproteins (M.W. = 1,300,000 [8]) migrated through starch gels,[9] while Smithies showed that fibrinogen (M.W. = 300,000 [8]) would not migrate. It seems likely, therefore, that the behaviour of macroglobulins and indeed other proteins on starch gels is a function of both molecular size and shape, as well as other factors.

I am now investigating the possibility of using starch-gel electrophoresis as a means of preparing pure macroglobulins and of differentiating macroglobulinæmia from myeloma without the aid of the ultracentrifuge.

I wish to thank Dr. D. H. Curnow for advice and encouragement, and Mr. R. Van Raalte and Mr. M. Hambly, department of medical photography, Royal Perth Hospital, for valuable technical assistance; also Dr. J. O'Dea, Commonwealth Serum Laboratories, Victoria, for the ultracentrifuge measurements, and Dr. I. R. Mackay and Dr. T. H. Hurley for kindly supplying the serum of the second case of macroglobulinæmia.

Department of Biochemistry, Royal Perth Hospital, Perth, West Australia

HELEN JEANETTE SILBERMAN † B.Sc. West Australia

* Spinco model-E ultracentrifuge; rotor An–A; centrifugal force, number × gravity = 182,000; serum-dilution of 1 + 4 in 0·2 *M* NaCl solution; pH = 7·0; temperature of rotor 20°C.

† Present address: Department of Biochemistry, University of Melbourne, Victoria, Australia.

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Reviews of Books

The Uniqueness of the Individual

P. B. MEDAWAR, F.R.S., Jodrell professor of zoology and comparative anatomy, University College, University of London. London: Methuen. 1957. Pp. 191. 18*s*.

THE title of this volume is that of its last chapter, in which Professor Medawar describes in summary the position of skin-grafting and transplantation immunity, to which he and his team have contributed many of its modern foundations. The sections of his book are based on previous essays and lectures—they include a commendably incisive presentation of the meaning and importance of the Darwinian and Lamarckian models of evolutionary inheritance, and a critical account of the handful of "respectable" experiments which have been advanced in support of the Lamarckian; there is also a reprinting of an essay on the nature and study of ageing, and of an inaugural lecture on its evolutionary biology. These contain important matter and have been frequently quoted; it is good to see them made accessible here. Essays on the biological imperfections of man, on pattern in organic growth, and on the philosophical implications of the scientific method represent other facets of the author's very substantial contribution to the thinking side, as it has been called, of modern biology. His prose style fits well in the English tradition of expository biological writing; it would repay reading if only for the demonstration it gives of the concrete scientific advantages of literacy, and the medical reader will find few books of comparable length which give so good a picture of the intellectual and practical approach of modern biology to its material.

A Student's Histology

H. S. D. GARVEN, B.SC., M.D., F.R.F.P.S., reader in histology, Institute of Physiology, University of Glasgow. Edinburgh: E. & S. Livingstone. 1957. Pp. 650. 55*s*.

IN the fatter textbooks, it sometimes seems that the ordinary student's needs are forgotten in the elaboration of the author's ideas. But Dr. Garven's new book, big as it is, fulfils its title.

The text is pleasantly broken up by illustrations, and the frequent paragraph headings also add to the reader's ease. The liberal use of diagrams is another attractive feature, and by this means Dr. Garven has avoided what can easily become a fault in books designed for students—over-lavishness with photomicrographs. As well as emphasising points described in the text, good diagrams also serve to direct attention to the study of actual microscopic preparations. Too many photomicrographs may mean that original slides are neglected. Photomicrographs are here confined to the places where they are likely to be most useful; and diagrams in colour emphasise certain features, such as the varying appearances of a single tissue when stained by various techniques.

The descriptive writing is clear, and the production of the book excellent. Dr. Garven has brought welcome aid to teachers and students by this lucid exposition of histological essentials.

Occupational Therapy

Principles and Practice. 2nd ed. Edited by WILLIAM RUSH DUNTON, JUN., M.D., founder and former editor of the *American Journal of Physical Medicine*, and SIDNEY LICHT, M.D., editor emeritus of the journal. Springfield, Ill.: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1957. Pp. 373. 60*s*.

AN introduction says that this book is written "by and for physicians." If they judge it on that basis, some readers may find it unnecessarily long and repetitive. It is not set out as a book of reference, but rather as a symposium by seventeen contributors on special aspects of the subject.

There are chapters on the special applications of occupational therapy in pædiatrics, psychiatry, cerebral palsy, upper-limb amputations, tuberculosis, and cardiac disease, and an admirable one by Lord Amulree on the specific problems of geriatric practice. Finally, a whole chapter is devoted to the use of music in hospitals and another to what is termed "bibliotherapy."

Dr. Paul White's contribution is a survey of heart-disease, in which he tends to emphasise the strictly medical aspects. An account of the pathology of Eisenmenger's syndrome seems inappropriate in a book of this kind.

The emphasis laid by British occupational therapy on helping patients to overcome practical difficulties of daily living by many ingenious devices is not reflected here, for the topic is disposed of in seven pages.

Nevertheless this well-produced book contains much useful information about an important and growing part of medicine.

Foot Troubles

T. T. STAMM, F.R.C.S. London: Duckworth. 1957. Pp. 122. 8*s*. 6*d*.

BOOKS about foot disorders are liable to be contentious or merely dull. Neither charge can be made against Mr. Stamm's book, the latest addition to the admirable Modern Health series. The real need for such a book is reflected in the large number of people who are concerned about the state of their feet and who seek orthopædic treatment without needing it: mothers are worried about normal phases in the evolution of their children's gait; daughters are apprehensive on contemplating maternal deformities ("are bunions inherited?"); and adults of both sexes and all ages are made miserable by minor disorders attributable to neglect. These people need reassurance and advice—not surgery. Mr. Stamm now answers, clearly and simply, all the questions which bombard the orthopædic surgeon in his clinic—and which often, perforce, get monosyllabic replies.

The book will be especially valuable to physiotherapists and chiropodists, and it deserves attention from some—shoe designers, for instance—who would not normally consider themselves very close to medicine. And if it is read as widely as it merits among doctors generally, there will be fewer patients arriving in orthopædic out-patient departments with letters saying "painful feet. ? arch supports."

Clinical Physiology

Edited by ARTHUR GROLLMAN, M.D., PH.D., F.A.C.P., professor and chairman, department of experimental medicine, University of Texas Southwestern Medical School, Dallas. London: McGraw-Hill. 1957. Pp. 854. 94*s*.

THE title is a little misleading, for this book is a good deal more than a textbook of applied physiology. Its subtitle, *The Functional Pathology of Disease*, better describes the way in which it embraces nearly the whole field of disordered function. Professor Grollman has been ably assisted by 25 distinguished contributors, most of them practising physicians. As a result, theoretical and experimental work has been closely related to clinical matters, and the result is altogether admirable.

Though the editor says he is addressing senior medical students, as well as interns and practitioners, the book would undoubtedly prove heavy going for all but exceptional students. As a work of reference for the more experienced clinician, however, it is invaluable, for it brings together biochemical, pathological, pharmacological, and bacteriological information that is otherwise to be derived only from many different sources.

Some Chapters of Cork Medical History

N. MARSHALL CUMMINS, M.D., F.R.C.P.I. Cork: University Press. 1957. Pp. 116. 8*s*. 6*d*.

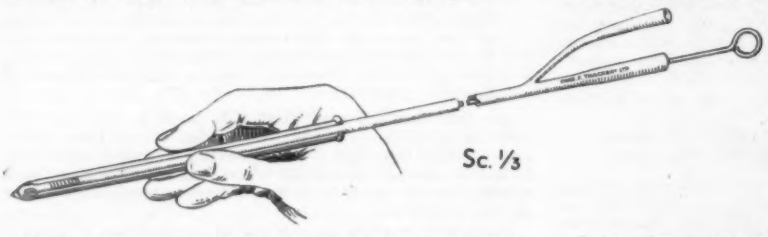
HOSPITAL charity dawned early in Cork, for the Chamber of Medicines and Physic Garden, the forerunner of the North Charitable Infirmary, was opened in 1711. In that city, as elsewhere, the story is the same—the gradual triumph over ignorance and indifference to disease and suffering. Dr. Cummins has collected, largely from manuscript sources, much interesting information about the earlier days of the Cork hospitals and medical institutions. There are chapters on the smallpox, typhus, and cholera epidemics and accounts of the temperance movement and the efforts to alleviate the lot of "climbing boys." The dreadful story of the famine in 1845–47 is the most moving of the many tragic episodes of want and disease which have afflicted the poor of Cork. Dr. Cummins tells of the horrors of famine in Skibbereen, Clonakilty, Schull, and Bantry, of correspondence with the Duke of Wellington, and of the welcome arrival of the *Jamestown* alongside Haulbowline laden with provisions sent by the American government.

Fluid Balance in Surgical Practice (2nd ed. London: Lloyd-Luke. 1957. Pp. 140. 20*s*.).—In 1954 we commended the first edition of Mr. L. P. Le Quesne's book as a good practical guide to surgeons. In this new edition there are increases of 10 pages and half a crown, but the extra space is well used, and the higher cost is well within the accepted range of present-day inflation. The text has been brought up to date, there is a fuller account of nitrogen and calorie balance, and a new section (by Dr. B. W. Webb) has been added on fluid balance in children.

New Inventions

A CANNULA FOR SUPRAPUBIC DRAINAGE BY FOLEY CATHETER

IT is sometimes convenient to drain a distended bladder by stab suprapubic cystostomy. Various catheters and tubes have been introduced into the bladder by a variety of instruments for this purpose.



It has always seemed that a Foley catheter would be useful for suprapubic drainage, but there was no simple method of introducing it into the bladder. The cannula depicted here serves this purpose well. It is a hollow tube with a sharp bevelled end and a longitudinal slit, which enables the inflation tube of the Foley catheter to slide along the cannula during its withdrawal. The catheter itself (size 18 or 20 French), made rigid by a straight metal introducer, acts as the trocar.

Using local anæsthesia, a small incision is made in the skin of the abdomen 6 to 7 cm. above the pubis, 2 cm. to the right or left of the midline. The rectus sheath is incised, and with the cannula held as shown, and directed downwards, backwards, and slightly inwards, the distended bladder is perforated, the straight introducer holding the catheter steady, and the hand supporting the catheter. The catheter is held in position while the cannula is withdrawn over it, the bag of the catheter is inflated with 10–20 c.cm., and the introducer is pulled out. The catheter can then be connected immediately to closed drainage apparatus, and a skin suture inserted. The operation has been found simple and effective.

It is a pleasure to acknowledge the help of Mr. Howard M. Jamison, F.R.C.S., in developing this instrument, which has been made for me by Chas. F. Thackray Ltd., Park Street, Leeds, from whom it can be obtained.

Newcastle General Hospital

JOHN SWINNEY
M.C., M.D., M.S. Durh., F.R.C.S.

MOTION SICKNESS

As a result of an evaluation* of a number of drugs, including other antihistaminics, for their ability to protect against motion sickness it was shown that the active constituent of Ancolan was 'the only compound that protected when given but once daily'.

* (*Journal of Pharmacology and Experimental Therapeutics*, Dec. 1955, p. 376).

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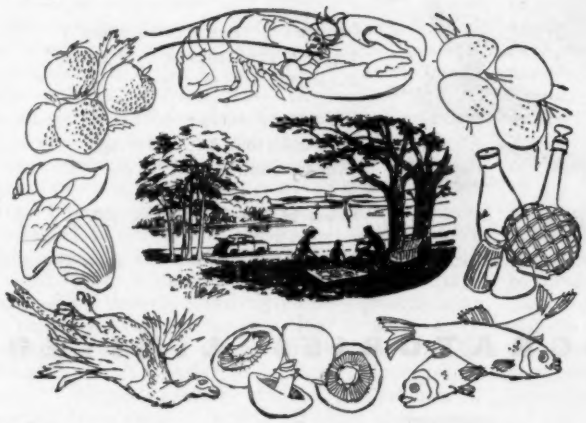

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THE LANCET

LONDON: SATURDAY, JULY 6, 1957

Surgery of Portal Hypertension

SINCE MCINDOE [1] forecast the use of an Eck's fistula for decompression of the portal venous system, and WHIPPLE [2] and BLAKEMORE established the operation in surgical practice, much has been learnt about the clinical course and management of portal hypertension; but its pathogenesis continues to puzzle pathologists and clinicians alike. In addition to portal cirrhosis—the origin of which can be determined in less than half of clinically advanced cases—many obstructive factors have now been identified both inside and outside the liver; but, experimentally, neither partial nor complete occlusion of the portal vein permanently raises the portal venous pressure; and to ascribe portal hypertension to obstruction alone would be gross over-simplification. Similarly, it remains a mystery why in some patients with a raised portal pressure, but not others, a tortuous collateral circulation develops through anastomotic channels around the œsophagogastric junction (with their flimsy wall and unshielded position they are singularly ill-suited for the dual rôle of passage-way and reservoir), thus predisposing to repeated massive hæmorrhages. These represent a twofold menace: in addition to the immediate effects of blood-loss, the large blood-protein meal can precipitate hepatic coma when the detoxicating function of the liver is impaired. There is no direct proof for the hypothesis that such a collateral circulation develops only in the absence of congenitally preformed portacaval shunts, though such potential pathways certainly exist in some people [3]; and so far no hypothesis has explained why portal back-pressure is especially liable to produce varices which bleed (and sometimes do not stop bleeding) around the cardia rather than in the mesenteric portal radicles or in other anastomotic sites. But even in cases where œsophagogastric varices do form, the onset of bleeding cannot be correlated accurately with the rise in pressure—no more accurately, in fact, than cerebral vascular accidents with systemic hypertension. Though the portal venous pressure is certainly raised in those who bleed, in healthy people coughing or the reversed Valsalva manœuvre can raise it far higher without causing hæmorrhage.[4] It is indeed possible that the bleeding does not always come from ruptured varices directly (as it does from hæmorrhoids) but from the shallow ulcers of peptic œsophagitis which coexist in a large proportion of patients.[5] Surgical assault, with its limited aim of preventing hæmorrhage, is thus directed against an unpredictable episode in an ill-understood pathological process that complicates a disease of which the origins, more often than not, are obscure. No wonder that its first trials have driven many thoughtful surgeons to despair: even in 1955 OGILVIE spoke of shunt operations as "the latest craze." [6] But "portal hypertension [is] more than just a number of measurements," RAVDIN justly remarks; "it represents a grave threat to life" [7]; and surgeons must prove their worth not by explaining but by diminishing that threat.

Reviewing the results of surgery in his own hospital and in other large American centres, RAVDIN affirms that "no question exists in the minds of those interested in portal hypertension as to the advisability of undertaking shunting operations on individuals who have bled previously" [7]; and a similar conclusion is reached by MILNES WALKER in his five-year follow-up report of 56 cases.[8] Certain contra-indications are, of course, accepted. In 1951 LINTON [9] postulated that in patients to be operated on jaundice should be minimal or absent, ascites should not be prominent, the serum-albumin level should be above 3 g. per 100 ml., hepatic coma should not have been present, the prothrombin-time should be normal or near-normal, and bromsulphthalein retention should not be more than 20% after forty-five minutes; but, though these criteria are still generally valid, RAVDIN has noticed "a certain relaxation of those standards" in recent years "when it was felt to be in the best interest of the individual patient." [7] Such a relaxation has been the result partly of improvements in preoperative and postoperative care (especially the judicious use of a low-sodium diet,[10] the replenishment of plasma-proteins and blood-volume, and the effective sterilisation of the gut with antibiotics) and partly of refinements in operative technique; but the most powerful impetus for surgeons has undoubtedly been their growing experience in the clinical assessment of patients and the interpretation of radiological appearances, which has made them less dependent on bare laboratory figures. Clinically they have come to appreciate that cirrhosis—by far the commonest cause of portal hypertension—can produce several distinct syndromes, which differ widely in their response to surgery.[11] Of these syndromes the neuropsychiatric symptom-complex of "portal-systemic encephalopathy" (a better name than "hepatic coma") has aroused especial interest. Since MCDERMOTT and ADAMS reported "episodic stupor" after shunt operations,[12] several investigators have drawn attention to its frequently chronic, intermittent course [13 14]; and the fact that its biochemical mechanism is still incompletely understood,[15] has stimulated clinical observers and possibly accounts for a graphic quality in many of their descriptions. The characteristic motor disturbance ("flapping tremor"), which consists in bursts of rapid flexion-extension movements at the wrists and metacarpophalangeal joints when the arms are extended and the fingers separated, has been likened to the beating of a bird's wings [16];

1. McIndoe, A. H. *Arch. path. (Lab. Med.)* 1928, **5**, 23.
2. Whipple, A. O. *Arch. Surg., Chicago*, 1945, **122**, 449.
3. Madden, J. L., Lore, J. M. Surgical Anatomy of the Portal System. Surgical Forum. Philadelphia, 1952; p. 133.
4. Taylor, F. W. *Ann. Surg.* 1954, **140**, 652.
5. Wagenknecht, T. W., Noble, J. F., Baronofsky, I. D. *Surgery*, 1953, **33**, 869.
6. Ogilvie, H. *J. R. Coll. Surg. Edinb.* 1955, **1**, 123.
7. Ravdin, I. S. *Ann. R. Coll. Surg. Engl.* 1957, **20**, 71.
8. Walker, R. M. *Lancet*, 1957, **i**, 57.
9. Linton, R. R. *Ann. Surg.* 1951, **134**, 433.
10. Ebeling, W. C., Bunker, J. P., Ellis, D. S., French, A. B., Linton, R. R., Jones, C. M. *New Engl. J. Med.* 1956, **254**, 141.
11. Stokes, J. F., Rosenheim, M. L. *Brit. med. Bull.* 1957, **13**, 142.
12. McDermott, W. V. jun., Adams, R. D. *J. clin. Invest.* 1954, **33**, 1.
13. McDermott, W. V. jun., Adams, R. D., Riddell, A. G. *Ann. Surg.* 1954, **140**, 539.
14. Sherlock, S., Summerskill, W. H. J., White, L. P., Phear, E. A. *Lancet*, 1954, **ii**, 453.
15. *Ibid*, 1957, **i**, 623.
16. Sherlock, S. *Brit. med. Bull.* 1957, **13**, 136.

and, observing early mental symptoms, HUNT and WHITTARD [17] came to the "regrettable conclusion that the choleric temperament, when present in patients with cirrhosis, is evidence of a relatively stable though defective liver function, whereas a change to repetitive politeness and pointless agreeability should be regarded as a symptom of incipient coma and therefore viewed with grave suspicion." [17] (It should be remembered, however, that bizarre cerebral manifestations—which are probably caused by toxic metabolites of intestinal origin by-passing the liver—can be present without spider nævi, palmar mottling, loss of hair, testicular atrophy, or any other classical feature of parenchymatous liver damage; and that enough liver tissue may still be functioning to give normal or near-normal results of liver-function tests.) Improved understanding of the abnormal patterns of portal venography has immensely increased the value of radiology in the selection both of patients for operation and of the best operation for individual patients. Whether the investigation is performed by percutaneous splenic puncture [18–21] or by injecting the mesenteric vein at laparotomy,[22] it is now almost always possible not only to display the extent of œsophageal varices, but also to distinguish cases of intrahepatic obstruction from the surgically important minority who have some form of extrahepatic block: and BASU and DAS [23] have described what they regard as the characteristic appearances of tropical splenomegaly without cirrhosis and of suprahepatic obstruction due to blockage of the hepatic venous outflow.

Though there is still a place for lienorenal shunt operations when the portal vein is unsuitable for anastomosis (as it is in extensive thrombosis or when the main vessel is replaced by multiple "cavernomatous" channels), and splenectomy can be of benefit when hypersplenism is the dominant syndrome or when the principal abnormality is in the splenic vessels, most surgeons agree that the most dependable method of decompressing the portal venous system is an end-to-side portacaval anastomosis.[7 8 24] (Even thrombosis is not always an insuperable obstacle: thrombectomy, with or without regional heparinisation, can sometimes restore the patency of the vessel.[17 24]) In recent years the operative mortality in several representative series has been between 7 and 16% [7 8 24–26]; and, since the operation undoubtedly prevents recurrence of hæmorrhage in at least 9 out of 10 survivors, these are acceptable figures. Commenting on them, RAVDIN emphasises that "the exact mechanism for the cessation of variceal hæmorrhage remains as much a matter of conjecture as the ætiology of portal hypertension itself" [7]: it is only possible to point to certain changes which regularly follow the operation. Measurements of the portal circulation-time [27] and of the wedged hepatic-vein pressure,[28] portal venography,[29] bile-acid concentration tests,[30] and direct recordings of pressure in the œsophageal varices [31] have proved beyond doubt that the anastomosis remains open in the vast majority of cases; and NARDI,[32] using radio-colloidal chromic phosphate, have demonstrated an increased hepatic arteriovenous oxygen difference, probably due to a slower perfusion-rate and a more complete extraction of oxygen from hepatic-artery blood by the liver cells. The greatest anxiety in all shunt operations has been the effect they might have on hepatic function; for the portal vein carries at least 70% of the blood-supply to the normal liver. But the carefully planned investigations of MACPHERSON et al.,[33] and the more recent series of ELLIS et al.,[34] have clearly shown that diversion of the portal stream in cirrhotic patients is hardly ever followed by any detectable deterioration of liver function. Of all the liver's remarkable qualities none is more astounding than the way it combines complexity of function with simplicity of structure. "There is something magnificently primitive about the liver . . . that takes the mind back to the youth of the earth, when our unicellular ancestors lived their simple lives in the primæval slime" [35]; and it seems that this corporate body of simple-looking cells, each of which can perform an incredible number of chemical transformations on the most meagre resources, has the power of survival and repair of primitive organisms.

Apart from gaps in theoretical knowledge, many practical problems remain unsolved. Despite a better understanding of the pathogenesis of ascites—the crucial part played by sodium-ion retention,[36] the doubtful rôle of steroid hormones,[37] and the mechanical effect of obstruction at the level of the venous outflow from the liver [38]—its treatment remains one of the "least brilliant chapters in surgery." [7] Shunt operations are certainly more likely to aggravate than to improve a patient's condition when ascites is his main complaint, whereas medical measures can offer at least temporary relief.[11] With a steady decline in operative mortality it was also right that the question should be asked: Why not advise prophylactic surgery in all patients with varices before bleeding occurs? Several American clinics have reported such alarmingly high mortality-rates from first bleeds as 60–75% [39 40]; and RAVDIN feels that it is "reasonable to assume that all, or almost all, patients with varices as the result of cirrhosis will eventually bleed if they do not succumb to their liver disease first." [7] Most British surgeons, on the other hand, do not regard the risk from the initial hæmorrhage as nearly

17. Hunt, A. H., Whittard, B. R. *Lancet*, 1954, i, 281.
18. Abeatici, S., Campi, L. *Acta radiol., Stockh.* 1951, **36**, 383.
19. Atkinson, M., Barnett, E., Sherlock, S., Steiner, R. E. *Quart. J. Med.* 1955, **24**, 77.
20. O'Sullivan, W. D., Evans, J. A. *Surg. Gynec. Obstet.* 1955, **101**, 235.
21. Sutton, D. *Brit. med. Bull.* 1957, **13**, 99.
22. Du Boulay, G. H., Green, B. *Brit. J. Radiol.* 1954, **27**, 423.
23. Basu, A. K., Das, A. *Brit. med. J.* 1956, ii, 916.
24. Blakemore, A. H. *In* Cristopher's Textbook of Surgery, edited by Loyal Davis. Philadelphia; 1956.
25. Child, C. G., III *New Engl. J. Med.* 1955, **252**, 837.
26. Jahnke, E. J. jun., Palmer, E. D., Sborov, V. M., Hughes, C. W., Seeley, S. F. *Surg. Gynec. Obstet.* 1953, **97**, 471.
27. Newman, H. F., Cohen, I. B. *J. Lab. clin. Med.* 1949, **34**, 674.
28. Myers, J. D., Taylor, W. J. *J. clin. Invest.* 1951, **30**, 662.
29. Rousselot, L. M., Ruzicka, F. F., Doehner, G. A. *Surgery*, 1953, **34**, 557.
30. Akita, H., Kuck, J. F. R., Waller, G. L., Johnston, C. G. *Ibid*, 1954, **36**, 941.
31. Palmer, E. D. *J. Amer. med. Ass.* 1951, **147**, 570.
32. Nardi, G. L. *Arch. Surg., Chicago*, 1955, **70**, 530.
33. Macpherson, A. I. S., Owen, J. A., Innes, J. *Lancet*, 1954, ii, 356.
34. Ellis, D. S., Linton, R. R., Jones, C. M. *New Engl. J. Med.* 1956, **254**, 931.
35. Ogilvie, H. *J. R. Coll. Surg. Edinb.* 1956, **1**, 50.
36. Eisenmenger, W. J., Blondheim, S. H., Bongiovanni, A. M., Kunkel, H. G. *J. clin. Invest.* 1950, **29**, 1491.
37. Cameron, C. B. *Brit. med. Bull.* 1957, **13**, 119.
38. Madden, J. L., Lore, J. M., Gerold, F. P., Ravid, J. M. *Surg. Gynec. Obstet.* 1954, **99**, 385.
39. Nachlas, M. M., O'Neil, J. E., Campbell, A. J. A. *Ann. Surg.* 1955, **141**, 10.
40. Welch, C. S., Kiley, J. E., Reeve, T. S., Goodrich, E. D., Welch, H. F. *New Engl. J. Med.* 1956, **254**, 493.

so great [41]; and few would operate on symptomless patients as a prophylactic routine. What does, however, lend especial urgency to this problem is the lack of any reliable emergency measure for dealing with life-threatening hæmorrhage. Many ingenious operations have been proposed (and most of them work in the hands of their advocates); but the junior surgeon in the provincial wilderness will find the tremendously increased vascularity of the upper abdomen a formidable bar to any major abdominal procedure,[42–44] transœsophageal manœuvres well beyond his endoscopic skill,[45 46] and continued balloon tamponade difficult, often ineffective, and sometimes dangerous. In dire emergency there may be something to be said for falling back on first surgical principles: simple packing of the upper stomach and the lower end of the œsophagus through a gastrotomy, with a gastrostomy tube left *in situ* for feeding will stop the bleeding and keep the patient alive until a more definitive operation can be undertaken.

A Geneticist Looks at Human Intersexes

TODAY'S article (p. 20) from Israel by Dr. DANON and Dr. SACHS is chiefly remarkable as the first major attempt by geneticists to grapple with the problems of human sexual differentiation that have been thrown up in such abundance since the nuclear sexing methods of BARR enabled us to determine the sex-chromosome constitution in man.[47] Sex in mammals has not much attracted the geneticists: there have been brisk disputes over the existence of the Y chromosome, and over the behaviour of the sex chromosomes at meiosis (Dr. SACHS has been especially active in the latter [48]); but on the whole, once it had been established, about the time of the 1914–18 war, that the XX/XY sex determination works for man and mammals much as it does for fruit-flies and fungi, the subject was left very largely to the endocrinologists. The complex phenomena of endocrine sex differentiation, though obviously secondary to genetic mechanisms, seemed an easier and more profitable line of study.

This formal re-entry of the geneticists into a field which should much concern them is especially welcome in two ways. In the first place, DANON and SACHS accept without serious reservation the major premise of all nuclear sexing—that the sex chromatin (only they call it a chromocentre) is an indicator of the presence of the XX chromosome pair in the nucleus. It is true that few except armchair critics have seriously contested this; but, though BARR himself is an anatomist with special interests in nuclear structure and function, those who have followed him have been chiefly endocrinologists, pathologists, or pædiatricians with no prior claim to speak with authority on nuclear matters, and this acceptance of the method by professionals strengthens the hands of all concerned. In the second place, the Israeli workers are able to review the genetic background of the main forms of human intersex from the standpoint of a wider acquaintance with the genetically possible than any of their predecessors has had. As regards most forms of intersex their conclusions are not very different from those of other investigators.[49] Three aspects of their paper, however, demand especially close attention.

When last we reviewed Klinefelter's syndrome [50] we were unable to find any hypothesis of its origin that sounded at all plausible. The cases reported had all the appearances of being males, normally or very nearly normally developed in all respects except atrophic testes (testes which could even show spermatogenesis to a very limited degree)—and yet their nuclear sex was female. DANON and SACHS have now put forward a possible genetic explanation of this. Most of us who have ever thought about the matter at all have assumed, one imagines, that the sex-chromosome mechanism works in some such way as this: the X chromosome carries a female factor (let us call it F) and the Y chromosome a male factor (let us call it M); the male factor is much stronger than the female (M>F) so in the XY individual, where both are present, M carries the day, but in the XX individual there is no M present and the F factor wins. This, it appears, is only half the truth. The female factor F is carried by the X chromosome, but the Y chromosome is a mere blank counter of no importance. The male factor M is carried by some other chromosome (an autosome in fact) and is present at constant strength in both sexes. Their strength is intermediate between that of the female factor in X and XX—i.e., M = $1^1/_2$ F. So the two Fs of the XX female overbalance the M factor, but this M factor in its turn overbalances the single F factor of the XY male. This mechanism clearly depends for success on constancy of the M factor. In insects it has proved possible to vary it and produce intersexes. In mammals this has not yet been attempted. But DANON and SACHS suppose that in Klinefelter's syndrome the essential lesion is a mutation of the M-carrying autosome producing an increase in strength sufficient to overpower the XX chromosome pair—so that there is masculine development in a person bearing female nuclear sex—with just enough remnant of abnormality in the tissues to prevent the formation of a normal testis. Undoubtedly this hypothesis makes sense. Direct proof of its accuracy will be singularly difficult—always a defect in a hypothesis. Evidence of the existence of this autosomal M factor in mammals would, however, be welcome: evidence of transmission of the Klinefelter lesion through normal males (since presumably *excess* of M factor would not harm a male) would also help. For the present we may accept this as the best hypothesis available to account for this extraordinary syndrome.

Another syndrome, less well known than Klinefelter's but equally bizarre, is MORRIS's "testicular feminisation." [51] These patients are externally normal females, with primary amenorrhœa and failure of post-pubertal secondary sex characters. Their gonads resemble testes; they show maternal-line inheritance; and by nuclear sexing they are female. DANON and SACHS suggest that they are XXY and

41. Horton, R. E. *In* Textbook of British Surgery, edited by Sir Henry Souttar. London; 1956.
42. Phemister, D. B., Humphries, E. M. *Trans. Amer. Surg. Ass.* 1947, **65**, 17.
43. Tanner, N. C. *Proc. R. Soc. Med.* 1950, **43**, 147.
44. Wooler, G. *Ibid*, 1955, **48**, 486.
45. Crile, G. jun. *Surg. Gynec. Obstet.* 1953, **96**, 573.
46. Macbeth, R. *Brit. med. J.* 1955, ii, 877.
47. See *Lancet*, 1954, ii, 638; *Ibid*, 1955, ii, 654.
48. Sachs, L. *Genetica*, 1955, **27**, 309; *Ann. Eugen.* 1953, **18**, 255.
49. Barr, M. L. *Canad. med. Ass. J.* 1956, **74**, 419. Lennox, B. *Scot. med. J.* 1956, **1**, 97. Polani, P. E., Lessof, M. H., Bishop, P. M. F. *Lancet*, 1956, ii, 118.
50. *Lancet*, 1956, ii, 877.
51. Morris, J. M. L. *Amer. J. Obstet. Gynec.* 1953, **65**, 1192.

their mothers XXX. The evidence depends on the study of abnormalities in the sex chromatin itself as well as of the mode of inheritance. Here at least we have a hypothesis that, with a very little improvement in our present techniques of chromosome counting in man, should become susceptible of rigid proof.

In the report from Israel the third noteworthy feature—a more general and less clearly original suggestion—provides an explanation for some of the endocrine anomalies of these genetically abnormal cases. DANON and SACHS emphasise that normal genetic condition of the cells of a target organ is as important for its full functional development as is a normal endocrine stimulus. No combination of hormones has yet made an XY breast secrete milk. The development of the accessory genitalia of the embryo, though chiefly a matter of the right hormone, is not entirely so: it requires more œstrogen to feminise an XY embryo, and more androgens to virilise an XX one, than are needed if the hormones are those appropriate to the genetic constitution. This explains the imperfect masculinisation of both Morris's and Klinefelter's syndromes—androgens are adequate, the tissues imperfectly responsive. Similarly the pituitary in Klinefelter's syndrome is exposed to a dose of androgens which would normally suppress its output of follicle-stimulating hormone (F.S.H.); but, being at least in one sense a pituitary of the wrong sex, it is inadequately sensitive to androgens. This cannot be the whole story—there are after all, some cases of Klinefelter's syndrome with male nuclear sex and they also have high F.S.H. values—but it is at least a useful correction to the general tendency to regard the pituitary as a sexually neutral organ.

Several of DANON and SACH's hypotheses may in time prove untenable. But none can doubt the value of this provocative survey of a new field from a new viewpoint.

Annotations

DOWN AMONG THE ARCHIVES

THOSE of us with excessively tidy minds commonly answer a letter and immediately throw it away, and then must retrieve it from the waste-paper basket to find the address; whereas those who store every document must soon consider taking larger premises. This difficulty now besets our hospitals. The increase in staff and the fashion for keeping more and more complete case-notes, and indeed the simple progress of time, have led to a vast increase in the amount of paper in hospital vaults. If records are to be useful they must be indexed—a costly process. Accordingly, the Ministry of Health [1] has permitted the destruction of records six years after the patient was last treated or three years after his death. Many are alarmed at this decision, for three reasons. First, when a patient is readmitted to hospital, case-notes may be the only record of previous illness or treatment. Secondly, some of these documents have historical interest as the manuscripts of outstanding physicians, or as records of notabilities who fell into the hands of doctors (thus inquiries have been made for mental-hospital records concerning Charles and Mary Lamb and Arthur Rimbaud). Thirdly, case-notes can be used as research tools in retrospective investigations.

Attention has been drawn in our correspondence columns to the dangers of destroying records [2] and to the expense of preserving them [3 4]; more lately Dr. F. F. Cartwright [5] has pleaded eloquently for the establishment of a central registry where all hospital notes could be stored and indexed, and the possibilities have been mooted of microfilm and of television transmission from a central registry.[6] Storing information electronically is another possibility. Nearly everyone will be in favour of preserving this information if possible: the objections are economic. To buy and furnish some large country building and to transport notes there would be expensive; indexing them so that they would be useful would cost even more, especially if automatic or photographic techniques were used. Would the expense be worth while?

Alternative methods suggest themselves for records of immediate practical value or historical interest. Thus a brief note giving diagnosis and treatment, for use if the patient were readmitted, might be made on a single card to be kept at the hospital till his death and then destroyed; while records of and by the great of past ages might rank as historical manuscripts and suitably go to libraries; difficulties in selection would be obvious but soluble. The chief dissension will concern the keeping of full records indefinitely for research purposes. Though their value for this has often been questioned they can be very useful, as Honey and Truelove [7] (among many others) have found. But research-workers rarely consult the more venerable records, and it might be best to aim at a compromise by keeping records intended for use in research centrally for a limited period (say, twenty-five years); this would ensure that plenty of material was available, without the burden of an ever-growing mass. The cost would be considerable; but there might be savings in the record departments of individual hospitals, which would be spared much indexing. Perhaps more serious is the libertarian objection to centralising confidential information. At least we may hope that these questions will be thrashed out and a decision made before hospitals, bulging with paper, destroy material of potential value.

1. Public Records. Ministry of Health. National Health Service. Eighth Schedule (1956).
2. Shelton, M. O. *Lancet*, 1957, i, 684.
3. Brocklebank, J. A. *Ibid*, p. 734.
4. Hunt, L. W. *Ibid*, p. 885.
5. *Times*, June 19, 1957.
6. *Ibid*, June 21.

THE MONTEFIORE MEDICAL GROUP

THE Montefiore medical group, formed as an extension of the pioneer work of the Montefiore Hospital in closing the gap between home and hospital, has set itself the task of providing a comprehensive range of health care for a population of 25,000 in a New York borough and part of an adjacent county. It achieves this by means of a group practice, with premises close to the hospital. Silver et al.[8] explain that the patients of the practice are insured under the Health Insurance Plan of Greater New York, and for an annual premium the group practice offers to its subscribers a wide range of health care. The group is organised to provide the patient and his family with a "family doctor" and a pædiatrician, who may call upon the help of specialists in all the usual departments of a large hospital without further cost. Only if admission to hospital is necessary does further charge arise, and this also may be covered by insurance. The fifty doctors in the group practice are paid by salary according to scales representing the value of the worker to the group, and the case-load carried. In 1954 there were the equivalent of about 23 full-time physicians to care for a population of 20,000 subscribers. The maximum list for a family internist is 1500, and that for a pædiatrician 800. The unit hopes to achieve a forty-four-hour working week for its staff, with paid vacations and study leave, having due

7. Honey, G. E., Truelove, S. C. *Lancet*, 1957, i, 1155, 1209.
8. Silver, G. A., Cherkasky, M., Axalrod, J. *New Engl. J. Med.* 1957, **256**, 785.

regard to the higher susceptibility to coronary-artery disease and the lower life expectancy of doctors in less closely regulated practices.

It is claimed that this fusion of domiciliary practice with hospital work is economical in the use of specialist staff, and that all workers in the team have opportunities to learn from, and to teach, one another. The large staff establishment ensures that there is time to tackle the problems of practice at an almost leisurely rate. The family internist in the group is not a family doctor nor a general practitioner as we know the term, for he limits his practice to adults and distributes patients requiring minor surgery, obstetrics, orthopædics, dermatology, and ophthalmology—however simple—to his specialist colleagues. In this country it is unlikely that any scheme in which hospital dominance is inherent would prove acceptable. Here the hospital and the specialist reinforce the family doctor, whose responsibility is not abrogated even when his patients need spells of institutional care.

The interest of the New York experiment in social medicine—for it is nothing less—lies in the successful application of a comprehensive health-insurance programme in a country where the tradition of private practice is strong. Since it began in 1948 the practice has grown steadily year by year despite deliberate contraction of the area of intake. The Montefiore medical group is giving good service to the citizens of the Bronx, and at the same time it is proving once again the value of the team in medical practice.

GLUCOSE-TOLERANCE TESTS

GLUCOSE-TOLERANCE tests indicate the ability of the tissues to assimilate glucose, when this is present in excess of normal fasting levels. The usual oral-glucose-tolerance test produces a rise and fall in blood-sugar level, determined not only by rate of tissue disposal of glucose but also by rate of intestinal absorption—a variable which cannot be assessed by a single oral-glucose test. When the glucose is injected intravenously, only the exit of glucose from the blood is measured. Several factors account for this disappearance. Glucose diffuses into the extracellular fluid in the first few minutes, and it is excreted as long as the renal threshold is exceeded; glucose uptake by the tissues continues until fasting levels are reached. Nevertheless, the fall in glucose level after such a load seems to fit a simple exponential equation.

The intravenous-glucose-tolerance test has been used for many years, and much information has been collected about it.[1–6] The glucose disposal, measured by the rate of fall, has been assumed to be related to either the total blood-glucose level or the difference between the blood level and the previous fasting value. Each assumption excludes the other, and two indices of glucose assimilation have been described. The first, known as the total index, expresses the rate of fall of glucose level as a percentage of total blood-sugar. The second, known as the increment index, expresses the rate as a percentage of the level above the fasting value. Baird and Duncan [7] have measured glucose tolerance by oral and intravenous tests in diabetics before and during the administration of carbutamide. In keeping with earlier findings,[8 9] this drug lowered fasting levels but did not significantly change the range of blood-sugar excursion after meals. The curves of blood-sugar response to oral glucose before and during carbutamide therapy were very similar. Thus, by the usual criteria of rise above fasting value and duration before return to this, there was no change in glucose tolerance measured by oral-glucose load. When the intravenous tolerance tests were compared, there was no change in the increment index, but the total index showed a significant increase in glucose assimilation during carbutamide administration. If in fact glucose disposal is related to total blood-sugar level, then the total index should not change with variation in the loading dose or in fasting blood-sugar level. But the total index has been found to increase with a larger dose of glucose.[5 6] Thus, the increment index seems a more valid expression of glucose uptake by the tissues as it is independent of loading dose or fasting blood-sugar level.

The intravenous-glucose-tolerance test gives additional important information when associated with intravenous injection of insulin,[10] by affording a direct expression of insulin sensitivity or resistance. Previous attempts to measure this after oral glucose were foiled by the variability of intestinal absorption.

Clearly, it is important to know whether glucose tolerance changes with age. Silverstone et al.,[11] using the intravenous-glucose test with and without insulin, found that tolerance gradually decreased with increasing age; there was also a decrease in response to insulin. Similar results have been previously reported [12 13]; but they are at variance with those of other workers [2 5] who found no change with age.

The intravenous-glucose-tolerance test requires more frequent blood samples, but it avoids the nausea that may be felt after oral glucose. It need take only an hour to complete, and indeed the fall in blood-glucose is no longer exponential after this period. On the other hand, local venous thrombosis and pyrexia sometimes complicate large intravenous injections of glucose; and such ill effects must be weighed against the exact quantitative measurement of glucose tolerance which is obtained by the intravenous test.

CHEADLE ROYAL

THE value of active occupation and work as part of the treatment of patients in mental hospitals was one of the main themes of the articles we published last year and in 1955 under the title *In the Mental Hospital*. So much has lately been heard about this side of psychiatric treatment that anyone unfamiliar with the history of the care of the mentally ill might be excused for supposing that some notable new discovery had been made. What is in fact remarkable is that occupational therapy, after its value had been recognised by clear-sighted people in the last century, fell for so long into relative disuse. What we have been seeing in recent years is a reapplication of old ideas, which had been kept fitfully alive by those who were convinced of their importance. The provision of active useful work and the opening of locked doors (another half-forgotten advance of the 19th century) have been among the most prominent changes in the modern mental-hospital "revolution."

Last week, at Cheadle Royal Hospital, Cheshire, an occupational centre for patients was opened by Lord Derby; and in this attractive new building visitors to the opening ceremony were able to learn something of the impressive results that can be achieved by giving the patients work. As Dr. W. V. Wadsworth, the medical superintendent, explained, the handicraft type of occupational therapy is particularly helpful as a diversional activity for short-stay patients; but it has not

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3. Hamilton, B., Stein, A. F. *J. Lab. clin. Med.* 1942, **27**, 491.
4. Greville, G. D. *Biochem. J.* 1943, **37**, 17.
5. Amatuzio, D. S., Stutzman, F. L., Vanderbilt, M., Nesbitt, S. *J. clin. Invest.* 1953, **32**, 428.
6. Duncan, L. J. P. *Quart. J. exp. Physiol.* 1956, **41**, 85.
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8. *Lancet*, 1956, ii, 180.
9. *Ibid*, 1957, i, 259.
10. Lazarus, S. S., Volk, B. W. *J. Lab. clin. Med.* 1952, **39**, 404.
11. Silverstone, F. A., Brandfonbrener, M., Shock, N. W., Yiengst, M. J. *J. clin. Invest.* 1957, **36**, 504.
12. Smith, L. E., Shock, N. W. *J. Gerontol.* 1949, **4**, 27.
13. Schneeberg, N. G., Finestone, I. *Ibid*, 1952, **7**, 54.

proved quite so useful for long-stay patients. Two other schemes had therefore been introduced: an outdoor working-party, who had helped with much of the work involved in building the new centre; and, for those who preferred indoor tasks, a small hospital factory where patients could do industrial work and be paid for it at trade-union rates. So far the factory had been operating only on a small scale, but the new building offered a chance for expansion.

In 1763 the trustees of the Manchester Royal Infirmary ordered a committee to consider the creation of a hospital for the mentally sick; and in doing so, as Dr. Wadsworth put it, they laid the real foundation stone of Cheadle Royal's new centre. He wondered whether that committee had imagined for a moment that the hospital they were starting would grow to ten times its original size and that the time would come when most of its patients would apply voluntarily for admission and when, of the many wards, only one male and one female ward would be closed. Life in the hospital was now modelled along the same lines as normal society, but with responsibilities not nearly so great. The psychiatric hospital thus became a school of learning where patients picked up the threads of their lives and gained the experience necessary to equip them for their return to normal life. It was the great hope at Cheadle Royal, Dr. Wadsworth declared, that groups of patients, trained in industrial work, might eventually be able to work side by side with other workmen in factories, even if they had to return to the hospital in the evening. Plans were being made to provide a hostel for this type of patient, who would then be able to live as normal a life as possible, apart from the most superficial medical and nursing observation.

In his speech at the opening ceremony, Mr. Christopher Mayhew, M.P., spoke inspiringly of the challenge which mental illness presented to the community. In his estimate, our aim should be no less than to raise the standard of our worst mental hospitals to those of our best. Though many hospitals are less fortunate than others in the quality of their buildings and many are handicapped by lack of staff, we have no doubt that great things can always be achieved by the sort of sustained enthusiasm and skill shown at Cheadle Royal by Dr. Wadsworth and his staff. A lot of money is needed to provide the material means for reaching Mr. Mayhew's goal: but more important than money is determination, and we hope that all who are concerned in providing for the mentally ill will combine their wills in a national resolve to build as quickly as possible on what has already been accomplished.

RISKS OF AORTOGRAPHY

CONTRAST aortography is being increasingly used as a method of diagnosis of lesions in the abdomen, though in this country it is mainly confined to the larger centres, partly because the apparatus is expensive and partly because there is justified caution in accepting a relatively new technique. The injection of dye into the aorta is an excellent means of displaying the renal blood-flow, and it is useful in the demonstration of renal tumours and other lesions. In a preliminary discussion [1] of the results of direct translumbar aortography, we suggested that it gave a more positive diagnosis than the usual intravenous pyelogram; and the few cases then reported indicated that the technique was reasonably safe. More recently we have drawn attention [2] to some limitations and risks of the technique.

Though Dos Santos [3] reported 300 cases without evidence of a periaortic hæmatoma, McAfee and Willson [4] think that a hæmatoma forms to some extent in about 3% of cases. The chance of a hæmatoma is not increased by puncturing an atheromatous plaque, but it is increased by making more than one puncture and by moving the patient once the needle is in situ. Much flank or lumbar pain raises the suspicion of a hæmatoma; and if it is large, radiographs show displacement of the kidney.

Disturbance of renal function is the most important hazard of aortography, and over 30 cases of serious oliguria have been recorded. Renal damage seems to arise mainly from direct injection into the renal arteries (or into the aorta between them) of large quantities of contrast medium, and the risk is increased if the lower aorta is narrowed. Some patients so affected seem sensitive to the contrast medium, for they also have urticaria and vomiting.[4] In all the recorded cases of oliguria, doses of 35 ml. or more of 70% diodone or 70% sodium acetrizoate were used. The warning signs are a dense nephrogram, flank pain, vomiting, and, later, oliguria. Two further instances of oliguria are recorded in this issue. In that described by Dr. Dormandy and her colleagues two injections of 25 ml. and 30 ml. of 70% sodium acetrizoate were given; and it is interesting to note that diminished function of the right kidney was observed in the second series of films, implying that the blood-flow to this kidney had been reduced by the first injection. In the case reported by Mr. Roy on p. 16 signs of cortical necrosis were found in the hydronephrotic kidney resected the next day (so far the evidence has indicated that the damage is mainly tubular [5]). The nephrectomy complicated the treatment of this patient and, as Mr. Roy points out, it is wiser to avoid surgery soon after aortography.

Injection into the superior mesenteric artery causes epigastric pain, nausea, and vomiting, and though 12 cases are recorded of direct injection with sodium acetrizoate or diodone, none have proved serious.[6] A death followed the use of sodium iodide.[7] Dissecting aneurysm has lately become recognised as a complication in about 1% of aortographies. Careful insertion and siteing of the needle seem to reduce the likelihood of this accident, but retrograde catheterisation of the femoral artery is probably safer. The catheter is readily followed on the screen, and direct injection into the renal or mesenteric vessels can be avoided. Robecchi et al.[8] in Italy catheterise the brachial artery, but, though they have had no accidents, it is doubtful whether their technique is as simple and trouble-free as femoral catheterisation. From a successful series of over 400 cases Sutton [9] concludes that small amounts of contrast medium are usually adequate, and have almost eliminated the risk of serious reaction.

De Villiers and Brink [10] in South Africa are now using aortography as a method of placentography. The site of the placenta is of course definitely established, and the radiation dose to the fœtus is slight because only one film is needed; but this technique is unlikely to displace placentography by the Reid method. Another report [11] tells of the use of aortography in delineating tumours in the mediastinum: this again is likely to be reserved for the rare case, but may possibly be helpful where other techniques have failed.

This very useful examination will doubtless be developed still further, and careful technique and restriction in volume and concentration of the contrast medium will make it largely free from risk.

1. *Lancet*, 1952, ii, 671.
2. *Ibid*, 1957, i, 874.
3. Dos Santos, R. L'Angiographie rénale. Athens, 1955.
4. McAfee, J. G., Willson, J. K. V. *Amer. J. Roentgenol.* 1957, **75**, 956.
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Points of View

THE HUMAN HERITAGE *

Sir HENEAGE OGILVIE
K.B.E., M.Ch. Oxfd, LL.D., F.R.C.S.
CONSULTING SURGEON TO GUY'S HOSPITAL, LONDON

"There is a higher sphere of inheritance and it must be sought, not through a microscope, not even by the most nicely adjusted experiments, carried on for a short time in the short life of one human being, but by a survey, incomplete though it must necessarily be, of what Nature, with time unlimited at its disposal, has effected among living things. We may be running the risk of becoming blind to the whole range of the possibilities of inheritance, if we concentrate too exclusively on the minutiæ of the means and modes by which, in certain cases, it appears to be effected."

F. WOOD JONES: *Habit and Heritage.*

ABOUT two years ago I had an illness of no particular importance, but enough to demand admission to hospital for a few days. Once placed on the moving belt of the diagnostic machine, I was subjected to every known test and handed over in turn to all the experts. As I am perpetually curious, and as all these experts were colleagues and many of them old pupils of mine, I wanted to know what they were doing and why, and have the whole thing explained to me.

When I took a lift to the laboratory I found my old house-surgeon, who is now one of the world's leading hæmatologists, reporting on my blood. He wished to examine a drop of fresh blood by phase contrast, and he proceeded to set up the apparatus and draw the blood. He focused the microscope and asked me to look. I gazed with a fascination I can still remember—partly because the population on whose business I was spying, unknown to them, were very much alive; partly because all the individuals of that busy crowd were in a sense my children and had, till a moment ago, been engaged in doing my business.

Over all the field were the erythrocytes, rounded and immobile but living automata, highly specialised to perform an intricate job, and, that job done, prepared to cast off without complaint. In and out among this stolid and immobile crowd weaved the leucocytes. These cells reminded me of old ladies in a bargain basement in Oxford Street, pushing their way with great determination by insinuating shoulder or elbow between those who obstruct them, yet all the time pausing at exhibits that interest them, feeling, sniffing, sometimes pouching a sample. These leucocytes seemed to move about in aimless hurry towards goals that varied from moment to moment. They would push their way among the erythrocytes, after squeezing past a gap far too narrow for them by pushing a promontory through it, pouring most of their granules into the promontory like marbles into a bag, and finally pulling the nucleus with the remaining cytoplasm through with a visible "pop." Once through, the leucocyte hastened to the site of attraction which, whatever it was, could be appreciated only by the eye of the leucocyte, and, after pausing for some moments, moved on, still in a hurry, on some fresh errand. The busiest and most purposeful, and certainly the most easily studied because of the size of their granules, were the eosinophils.

As I sat at the microscope, my mind went back to my first days as a medical student, before the first world war, when the pound was a golden sovereign, when each sovereign was worth twenty shillings, when a shilling would buy an excellent meal, and when even a penny would cover the postage of a letter or a mile of travel on the railway. I remembered the class in biology, starting with the protozoa and the amœba. I remembered studying an amœba in a drop of water under a coverslip, and having the nucleus and the cytoplasm with its granules and vacuoles pointed out to me. I remembered the pseudopodia which it pushed out to engulf little particles or to move its tiny bulk along. A trace of peptone would attract it one way, a trace of acid would repel it. I was told that this movement was due to chemotaxis or chemical attraction, the motive power of the simple amœba—a method of chemical communication that in the metazoa had been elaborated into a system of chemical messengers, the hormones, messengers that govern the growth and the behaviour of all vertebrates, that bring love and hate, hunger and fear, that rule the destinies of individuals and decide the fate of empires.

Here were my white corpuscles, similar in design and structure to the amœba, moving the same way, apparently doing very much the same job. The essential difference was that the amœba was an individual, doing its own job, while the leucocyte was part of me, doing my job. How was it that two such diverse cells—the one an individual (perhaps the lowest unit in the animal kingdom but still an individual) the other a unit in the blood-stream of a highly complex vertebrate—could be so similar? The amœba had all the properties of life. By what steps had this simple ancestor given rise to such highly differentiated descendants?

* * *

There are two possible methods by which a simple unicellular organism could evolve into that complex organisation of specialised cells, the vertebrate. The first method is by individual evolution, the second by colonialism.

* * *

The theory of evolution, put in its simplest form, implies that living organisms have arisen from a unified and simple ancestry by a long sequence of divergence, differentiation, and complication of descendant lines from that ancestry. The way in which evolution works is by no means certain, but it is summed up in the phrase "natural selection." Many more of any species come into existence than can survive to reproduce their kind, and the eliminating process that decides which of them shall survive to reproduce implies in some sense a "survival of the fittest." The quality that ensures survival and the opportunity to produce offspring may be size, courage, fierceness, speed, power of concealment, or ability to withstand heat or cold or dryness or moisture, to secure the right food under competition, to live on some article of diet that happens to be available in a certain place at a certain time. Whatever the quality may be, that quality and the physical characteristics with which it is associated are likely to be transmitted to the offspring and found in enhanced measure in subsequent generations.

It is easy to understand how existing qualities can be modified and improved by natural selection, how existing organs can be modified or turned to new uses. It is very difficult indeed to imagine how new qualities can be made to appear, or new organs be produced, by any process of selection—which implies choosing from something that is there already. Even the least scientifically minded of our generation find the later phases of evolution comparatively easy going; but the earlier parts of the road by which the amœba progressed in easy stages to the dogfish seem quite incomprehensible. Embryology helps us very little; for while a study of the developing embryo gives us a summary of the later evolutionary history of an animal, and a quick résumé of the main phases of its development over the last 500 million years, the first 2000 million years are recapitulated so briefly that we get no inkling as to the steps by which a protozoon became a metazoon, or what sort of a creature that first ancestral metazoon may have been.

* From the Wood Jones lecture given in Manchester before the Students' Medical Society of the university on May 7, 1957.

The understanding of the steps by which the complex creatures with whom we share the world have been produced is rendered all the more difficult by the process of metamorphosis, whereby an animal during development changes its plans suddenly and completely, often passing in the change from one element to another—from an aquatic to a terrestial existence, from a crawler to a flyer, from a fish to a quadruped, from a parasitic to an independent existence. The metamorphosis from the larval to the adult form often involves a complete change of structure during which organs fully developed and of intricate design are discarded and their material is used to make new ones having a totally different purpose. Further, the change is by no means always in the direction that we, with our limited comprehension, would term progress. Active free-swimming little mites that under happier circumstances might have travelled round the oceans and seen life settle down to become immobile polyps attached to the sea bed and dependent for their nourishment on what the ocean currents bring their way. In their fate there may be a moral pointing to the fate that sometimes overtakes our brightest medical students.

The most striking example of evolution gone wrong is seen in those primitive creatures the tunicata or sea-squirts. Hatched from the egg, the young sea-squirt is a free-swimming little tadpole, with a central ganglion, a tubular nervous system, a notochord, and the rudiments of an eye—indeed in the direct ascent to *Homo sapiens*. Then it shrugs its little tail and says "Why go further?" It attaches itself to a rock, sheds its notochord, its eye, and its nervous system, surrounds itself with an envelope of cellulose, and spends the rest of its life fanning into its mouth a current of sea-water from which it gets nourishment and from which it also extracts the infinitesimal quantities of vanadium that the sea contains, in order to form its own peculiar variety of blood pigment.

* * *

The second method by which a unicellular animal could give rise to a multicellular descendant—by which a protozoon could become a metazoon—is by colonisation. There are many examples of protozoa that live in colonies, the best-known among them probably being the sponges and the corals. Colonial animals are groups of individual creatures which are united together so as to form a mass of living matter. Such a colony usually arises by the method of asexual reproduction, the individuals thus formed by budding remaining together.

To the animal the advantages of cohabitation are considerable. The provision of food is much more certain when many ciliated mouths are combining to collect it, and its distribution is simplified when, through a confluence of their protoplasm, those that need can receive from those that have. The provision of an enclosing shell for the group, or of a skeleton to give it form, is simple when it is the work of many animalculæ.

Further, when the colonial habit is established, polymorphism among individuals proves advantageous to the group and is encouraged. In many coelenterates some of the constituent individuals specialise for sexual reproduction; they lose their mouth and their tentacles and are no longer able to feed themselves, but they receive food through the continuous protoplasmic substance of the colony. In other colonial groups, certain individuals are modified to form organs of attack or defence. The more highly developed colonial animal assumes a group individuality that supersedes the individuality of the single creatures that compose it. The colony, in fact, becomes the unit, rather than the individuals composing it, since these in combining for corporate action have lost their power of action as individuals.

These creatures, whose simple form and lowly habits take us back to the time when the Earth was young, when the continents were crude masses of jumbled rock covered by moss-like vegetation, and a sea with a salt content of about 0·6% lapped or roared round them, bring us to the fundamental question "How did life begin?" We shall probably never unveil that mystery; but in the study of the nucleic acids, of the genes, of the hormones, of the viruses, and of the steroids, with their closely allied chemical structure, we seem to be tugging at the curtain that hides the last secret.

How did the simple creatures of those far-off times start their climb up the ladder towards more complex forms? Was it by the formation of colonies and the steady development in those colonies of increasing specialisation among the individuals forming them, and of closer and more permanent association between the units in the colony? Or was it by the development, in a species, of increasing complexity of structure? The distinction is an important one. In a colonial organism, the units composing it, however modified, keep to some extent the tradition of independent existence; they keep some cell autonomy, while at the same time the colony must develop a group consciousness and some successful method of group communication. In a creature produced by progressive evolution, on the other hand, the individual is the unit and cell autonomy does not exist.

* * *

There is no record in embryology or geology that will answer this question; but there are many reasons why the gradual elaboration of a colony can be looked on as a possible means by which the more complex creatures, on which natural selection has since worked, were first produced. Firstly, the tendency to aggregation is a fundamental characteristic of living matter. Reproduction starts the individuals of the next generation together, and unless they need to separate in the search for food they tend to remain together. Even when they are separated, members of any species tend to seek the companionship of others of the same species. Birds of a feather flock together.

This herd instinct is an example of a quality that makes for survival and that therefore ensures selective breeding of that quality in the animals that possess it. The group is more effective than the individual. Members of a herd can protect each other when attacked, and the herd will survive when individuals would be overwhelmed. They can combine to attack an enemy or to round up prey where one might be overpowered. They can take turns to keep watch, or to guard the young of the herd.

Even in the fully developed vertebrate, we see that the herd instinct is tending to produce a new group that is profoundly modifying the process of evolution. The more the herd instinct is developed, the more does the herd itself become the individual, the more do the single animals composing it lose their individuality. In the vertebrates we see the herd instinct developed particularly among the hervibora, whether mammals or birds; creatures that must spend most of the day feeding; whose mouths are designed for cropping and grinding rather than for tearing, and whose limbs are fitted for flight rather than for attack. The carnivora are usually solitary hunters, but even in them we see the development of the pack. The most successful hunter in the animal kingdom is the African wild dog. He hunts in packs, in which numbers replace strength, and teamwork replaces speed, and he never fails to get the particular buck he has marked down for destruction.

* * *

The most remarkable examples of colonial organisation in fully developed animals are found among the insects. In bees, wasps, ants, and termites the hive, nest, or colony, is the only unit, apart from which the single creatures

have no existence, indeed cannot remain alive. A termitary, indeed, provides a striking example of how a colony of animals may come to resemble a single animal, and raises the thought that in the dawn of evolution a colony of protozoa may have become so organised and perpetuated in its corporate structure and economy that it eventually became a unit transmitting its characteristics to subsequent generations and forming the material on which natural selection could act still further.

The termitary, as seen in East Africa, is a pillar of red clay, smooth on the outside and rising to a height sometimes of thirty feet. Its interior is traversed by little burrows and chambers, the walls between them quite thin, and the passages extend beneath it into the ground and laterally, sometimes as far as fifty yards. In this mound live the termites—little white ant-like creatures which are blind and never come into the light, indeed shun it. These are the workers. They are bisexual and have wing rudiments, but they never reproduce, they never fly, and they work all day extending and repairing the termitary and getting food for themselves and their non-working colleagues. The non-workers are the soldiers and the courtiers. Both are sterile. The soldiers have large, hard heads carrying aggressive claws, and at the first sign of invasion of the termitary by ants or rodents they rush to the site of entry and attack the enemy. The courtiers live in a central chamber, the palace, and attend upon the queen. The queen herself is bloated to an enormous size, up to $4^1/_2$ inches, so that she can do nothing but her sole job which is to lay the thousands of eggs that develop into workers, soldiers, or courtiers —whichever the termitary needs at the time.

The resemblance of this habitation to an animal is striking. It has a body (of clay) covered with skin (the crust), a skeleton, and a vascular system round which the corpuscles (termites) are in constant circulation. The brain is the queen, for on her the activities and the life of the termitary depend. If she is killed, the termitary dies, the thousands of workers perish, and the walls of their abode crumble. How the queen sends her orders is unknown, but the communication system of the termitary is rapid and reliable. If a breach is made in the walls, the workers rush to the spot and repair the gap much more quickly than the tissues of a man can repair a tear of the skin.

* * *

When we see that an insect—a highly specialised creature, the final product of æons of evolution—can fuse its individual life so completely with that of its fellows as to resemble a new creation, it is not difficult to imagine that the simple protozoa of the world's beginning should have combined for mutual help and protection, and that eventually the combination should have been perpetuated in a new living entity, a metazoon. The features that distinguish a colonial animal from a metazoon are that in a colonial animal one individual merges into the next by protoplasmic continuity, and that if a piece is detached that piece can grow into a new colony. These features are details of cellular autonomy rather than of principle. With the development of special reproductive units, reproduction by fragmentation would go; with the appearance of any method of circulation, the need for exchange of material from cell to cell would disappear.

A further point favouring the view that metazoa first appeared as colonial aggregates rather than by the slow elaboration of simple forms is found in the diversity of species. It would be thought that evolution by the slow selection of increasingly specialised types would proceed along steady lines; that there would be a main stem from which many branches diverged, but that all creatures from the simplest to the most complex, would bear traces of a common ancestry. By the theory of slow elaboration it is very difficult to conceive the emergence of such fundamentally different types as animals with an internal skeleton, others with an external skeleton, and others with no skeleton at all; of animals with a nervous system ventral to the gut, and others with it dorsal; of oxygen-carrying compounds based upon iron, upon copper, and upon vanadium. On the other hand, if the first experiment in elaboration was by the aggregation of simple protozoa into clumps, any device may have come to trial and, if successful, may have been perpetuated.

* * *

The examination under the microscope of a film of living blood on a warmed stage gives an unforgettable impression of a group of individual cells setting about the day's work, each of them a specialist, each of them doing a defined job extremely well, yet all members of a large community, subscribing to its terms and working under a supreme directorate. The study of a healing wound gives the same impression of connective-tissue cells hurrying to the scene of damage, and setting about to repair it just as the termites hasten to repair the hole in their ant-hill. The crowding of working cells into a damaged area forms the typical microscopic picture of inflammation. Yet, though in lectures I have often compared the massing of granulocytes at a point of injury or infection with the rushing of troops to the front line to repel the invader, the concept of the human body as the final edition of what millions of years ago had been a colonial animal was first brought home to me by contemplation of the liver.

The first thing that strikes anyone about the liver is its uniformity. Whether it be examined by manual palpation during laparotomy, seen in cross section on the post-mortem table or at the butcher's, or studied in microscopic section at a class in histology, we see that the liver is a sheet of tissue of uniform appearance consisting of masses of closely packed cells separated by no very obvious intercellular boundaries. It is almost a syncytium. The cells are of uniform type, polygonal, with the nucleus in the centre, and their simple appearance reminds one of the ancestral type to which all epithelial cells tend to revert when they become malignant—the so-called carcinoma simplex. In this histological type of cancer, which may be found in the breast, the stomach, the colon, the lung, or the pancreas, the long pedigree of specialisation that led to a cell secreting only milk, pepsin, or trypsin has been thrown back to its beginnings so that even the expert cannot tell from studying the section where the cancer lay. These simple liver cells have no lobular arrangement like the cells of every secreting gland. The so-called liver lobule is no more than a convenient name for a part of the liver, roughly hexagonal in shape but separated by no structural boundaries, that lies between the channels of half a dozen portal canals. In intimate structures the cells are found to lie in sheets one cell thick, on one side bathed by blood, on the other side in contact with a biliary channel.

This community of simple cells is, in fact, responsible for processes of the utmost diversity and complexity. It is the chemical factory of the body. Food is taken into the alimentary canal and broken down by the digestive juices, and the simple compounds that result are absorbed by the intestinal villi. The energy of life is provided by oxidation, for which the red corpuscles absorb oxygen from the lungs and carry it to the site of combustion. But the final processing of the proteins, fats, and carbohydrates, the breaking-down of complex nitrogenous radicles into simple fuel units that are stored and handed out as they are wanted, the building up of other radicles into the larger molecules that are used by the tissues for repair and renewal of their structure, and into those enormous protoplasmic chains that are the individual structure of the body—all this is done by the liver.

The liver cell, like the amœba, combines simplicity of structure with complexity of function. Each other cell in the body has one function only. The epithelial cell protects, the nerve cell transmits electrical currents, the muscle cell contracts, the parotid cell secretes ptyalin, and the pancreatic cell secretes trypsin. All of them depend for their activities on the provision of prefabricated raw materials, all of them do one job only, and none of them can take on any other function. The liver cell can do everything. It can take in, build up, break down, and cast off.

The conclusion seems almost inescapable that the liver is a parasitic colonial animal whose services are indispensable to its host. The individuals of the colony are simple cells, low in the evolutionary scale. The colony itself is distinct in its anatomical boundaries, in its physiological functions, and in its biological properties from the rest of the body with which it cohabits. The liver has a feeding system peculiar to itself, the portal vein, through which it receives in transit all the foodstuffs that come into the body. It has an excretory system peculiar to itself (the biliary apparatus), emptying though a cloaca (the ampulla and papilla of the common bile-duct) into the intestine. The liver alone among the tissues of the body has the powers of survival and repair and of regeneration of a primitive animal. Any other tissue when damaged is damaged permanently; when cut it is healed by connective tissue; when mutilated the missing part is not replaced. It cannot produce fresh cells of its own specialised type. The liver can do these things. If it is damaged by disease, fresh liver tissue can grow to replace that which is lost. If a lobe is cut away, a fresh lobe of similar structure can replace it.

* * *

Where is all this leading? To the wild, improbable, but not impossible suggestion that the human body represents not a single individual but the latest and not necessarily the final phase in the evolution of a polymorphic colonial animal. The acts of *Homo sapiens* are not those of an individual but of a community. That there is a central directorate, a cabinet, a responsible control tower that we may call the mind, the soul, or the ego, according as our inclinations turn to philosophy, religion, or psychiatry, we cannot doubt. The lesser members of the community have their allotted chores that they are performing day and night according to a preordained schedule. It is only at times of crisis that the trumpet calling the community as a whole to action is sounded. But that call is "a wild call, and a clear call, that may not be denied." It is sounded at times of danger, and immediately the bowels and bladder are emptied, the tone of the voluntary muscles is increased, the pulse-rate and the systolic pressure are raised, the community prepares for combat or escape. The call comes to the hepatic soviet, and the communes of liver comrades turn the glycogen into glucose and bundle it into the circulation.

A local alert of a different type is sounded when the defences of the community are breached by bacteria. Here the priority call goes out to the Home Guard battalions of the leucocytes. All units patrolling the highways are summoned to the point of attack. They pour into the breach in their hundreds of thousands, and they die in their hundreds of thousands. But behind the lines millions of recruits are being enrolled, and as soon as they are ready they are sent up as reinforcements. The forward channels of approach, and the loopways leading to them, are enlarged to take the increased traffic. The factory workers in the liver are turned to the production of globulins, and the temperature is raised by increased combustion to hasten the chemical reactions of immunity. The whole of these reactions, the general and the local, are accurately timed and perfectly coördinated, and their very perfection postulates the existence of a central control mechanism instructing, and when necessary ordering, the actions of cells that at other times seem to be independent.

In fact, this coördination is very much akin to the mass control of individuals with a separate existence that is characteristic of herd life. When a procession of safari ants is obstructed by a stone laid across its track, the workers immediately stop and mark time, and hundreds of soldier ants hurry up to the obstruction and by mass efforts can generally move it. When they have succeeded, the orderly march goes on. Birds and fishes are individuals, and their search for food is an individual and nearly a whole-time job. But when a shoal of fish are manœuvring in shallow water, or a flock of starlings is assembling at eventide in preparation for a move to the dormitory, they wheel and turn in intricate gyrations, each individual performing the same turn at the same instant with a precision that suggests some central directing force controlling the herd. The mass migrations of some of the land mammals that takes place at intervals of six or seven years seems to be initiated and guided by some overruling urge of which the individual is quite unconscious.

The directive force whose nature we are seeking seems to be the same one that coördinates the movements of the starlings in the air and of the leucocytes in the labyrinth of the blood-stream. Each has the same purpose, to direct and associate the actions of individuals for the good of the larger organisation of which they form part. In the herd and in the body this force always acts wisely and for the best, at any rate when it is working as Nature intended that it should work. It is only in ourselves—in human beings—that we find instances that suggest that the control mechanism has itself got out of control, that the cells are doing the wrong work because they have been given the wrong orders. We have often studied the cellular reaction of inflammation in response to injury. Nothing could be more perfect. Nothing could be designed to effect more rapidly and with less disturbance the purpose for which it was called up—the elimination of the invaders and the repair of the damage they have done. And yet we see instances where the same cellular reaction has been called up with no invaders to repel and no damage to repair. Rheumatoid arthritis, ulcerative colitis, regional enteritis, these are all diseases in which the characteristic lesion is a local reaction with the gross and microscopic characters of chronic inflammation, yet in which the remedies against bacterial invasion are without effect and in which no causative organism has ever been isolated. Here it appears that the central control mechanism has gone wrong; but how, why, and what? We know that cortisone does good in these diseases, but we also know that the benefit lasts only while the cortisone is being administered. This suggests that some endocrine imbalance is at fault, but merely brings our inquiry back a stage. The adrenal is not at fault; what is the cause of the imbalance?

We find that victims of these diseases have certain features in common. They are young, but usually young adults who have left the shelter of the home. They are intelligent above the average, and they are conscientious. They are usually shouldering responsibilities that are proving heavy for them, or have recently undertaken new commitments. The poor, the manual workers, the elderly, and the prosperous seldom suffer. The grouping together of these qualities and circumstances immediately recalls other diseases in which the circumstances are similar—duodenal ulcer, thyrotoxic goitre, malignant hypertension. All these maladies have the common factor that the mechanism of their causation seems to be the evolutionary mechansim of preparation for combat misapplied and carried to excess.

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The final question we must ask is "what is the normal expectation of life in a cell colony?" The derangements

we are discussing are not due to corporate senescence, and yet it might be expected that as the colony gets older the first sign of failure would be in the machinery of central government. Colonies age, as do empires, and the first indication that they are past their zenith is an increasing unwillingness of the group to take part in the general affairs of State.

A dispassionate assessment would suggest that the normal spell of useful life in *Homo europeanus* ceases at 48 years. At this age the reproductive power of the female ceases, and that of the male starts to wane; the vascular system shows increasing inability to cope with the varying demands made upon it; the special sense organs develop defects that must be remedied by artificial aids; the respiratory epithelium tires in its ceaseless war against inhaled bacteria; the brain can no longer acquire new skills or deal with unwonted problems; the individual as a whole passes from the class of the workers and fighters to that of the drones.

At 48, the individual cell groups tend to lose their corporate loyalty, to increase their numbers without any social need, and to make demands for nourishment which their neighbours cannot satisfy. The question "why do so many of us get cancer after the age of 48" has proved entirely sterile as a guiding principle in research. It is surely time that we posed and faced the real problem. "We all have cancer at 48. What is the force that keeps it in check in the great majority of us?"

When I say that we all have cancer at 48, I mean that when we have reached that age some part of the epithelium covering our internal or external surfaces—the skin, the bronchi, the breast, the œsophagus, the stomach, the colon, the cervix uteri, the bladder, the prostate—has started in places to show those local changes of irregular multiplication and altered staining reactions that we call "cancer in situ." A patch of cancer in situ may remain in situ for twenty years, a pathologist's headache, but no trouble to the possessor. On the other hand it may suddenly develop invasive characteristics and become a frankly malignant tumour. What keeps it in check? What starts its Gadarene progress?

Like most general surgeons, I have treated and watched many cases of cancer. Some were relatives; many were friends; others, coming as patients, died my friends. I have slowly come to frame in my mind an aphorism that can never be stated as such, because no statistics can be advanced to support it: "The happy man never gets cancer." I have often caught myself thinking about a colleague, "So and so has started to look unhappy. He is either unhappy because he has got cancer, or he is going to get cancer because he is unhappy." So run my thoughts, and I try to dismiss them. Then I notice that he is missing from the next council meeting. Three months later I read his obituary in the *B.M.J.*

The instances where the first recognisable onset of cancer has followed almost immediately on some disaster, a bereavement, the break-up of a relationship, a financial crisis, or an accident, are so numerous that they suggest that some controlling force that has hitherto kept this outbreak of cell communism in check has been removed. The late appearance of secondaries, suggesting that over the years some undetected cancer cells have been lying latent and kept in check by some unknown restraining force, is a commonplace after operations for cancer of the breast. Very often—indeed, so often as to suggest that if the true cause could be discovered the problem of cancer treatment might be solved—the signal for renewed growth seems to have been some unhappy event.

* * *

Wherein then lies the control of the living matter that forms our bodies? The ultimate signals to the working cells are undoubtedly chemical messages, a broad category that includes the indentifiable hormones and such relatively simple substances as histamine and lactic acid. In command of the ductless glands is the pituitary, that ancient organ found in every animal high enough to have an alimentary canal and a nervous system, in the form of a tubular structure linking the cephalic end of the two. But above the endocrine squad there must be some coördinating centre that gives the pituitary its general instructions.

The pituitary (and to some extent the adrenal) have a twofold allegiance. Their position is like that of a company sergeant-major, on the one hand having access to headquarters and a knowledge of the reasons dictating the orders of the day, on the other hand being responsible that those orders are properly drafted and promptly obeyed. Each of these glands is a compound organ, half nervous half endocrine. But whereas the core of the adrenal is derived from the peripheral ganglia of the autonomic system, the posterior lobe of the pituitary is in direct anatomical continuity with those ancient aggregates of grey matter from which all coördinated activities that maintain life are directed, and to which acquired skills are relegated when they no longer need conscious control. Here the emotions seem to reside. In these basal regions of the brain, the centre we are seeking probably lies.

At most times, and in most people, the control centre exercises no more than gentle supervision. It diffuses upwards to the conscious mind an indefinable sense of well-being. It sends down to its underlings general instructions like those of a composer to his orchestra *andante, allegro ma non troppo, rallentando, piano,* and so on. At times the orders may be more specific: "Prostate squad, lacuna 357, second row, numbers 149 to 612—what the hell are you doing standing in a ragged group like a bunch of commies? For God's sake, pull your socks up and get into line." Or a general instruction may go out: "Calling all polymorphs—there is trouble in Square Y 4697. Get along and deal with it and report back."

It is at times of danger, or threatened danger, that the centre sends out a general call to all tissues for concentrated action, and it is this call that may be wrongly given when the control centre is jittery rather than euphoric. Instead of detailed instructions to meet a specific emergency, it sends out orders that indicate panic rather than planning: "Something is wrong—quick—mobilise the inflammation squad." "I don't like the look of things—prepare for urgent evacuation."

* * *

In suggesting that a happy man is captain of his cells and master of his fate, and that he is thereby immune from certain diseases, I am sending up a provocative balloon that any real scientist could shoot down. Further, the word "happiness" does not adequately describe the mood that I am striving to express.

Happiness is a poor term for the state of spiritual ebullience that ensures happy government of the republic of the body, that répels the stress diseases, that can keep even cancer in check. Happiness is a pallid emotion. The word suggests groups of worthy people, too meek to have any vices, sitting on clouds and twanging harps. The emotion I wish to describe has no name, but the Greek word "euphoria" and the modern slang "one-upmanship" come near to it. It implies complete and rumbustious confidence, a jingoistic joy that is prepared for any trouble, perhaps hoping for it in the secure confidence that the conflict, should it come, will end in victory. It is the spirit that sustained Winston Churchill through the darkest days of the war, and that communicated itself to millions of his countrymen.

The young man in love feels it. The surgical registrar feels it the day he gets his fellowship. At such times the

control centre sends out an order of the day to all cells: "Come the three corners of the world in arms, and we shall shock them. Naught shall make us rue if we unto ourselves do rest but true."

> [Man] "is only one of a vast multitude of wayfarers along a road of purpose. On this road all the wayfarers have equal rights. The end of the road we do not know. But once again we come to the realisation of the strange circumstance that that of which both the way and the wayfarers are made is the one thing that the universe seems powerless to destroy."
> —F. WOOD JONES: *Design and Purpose.*

Special Articles

WORK OF THE KING'S FUND

AT the 60th annual meeting of King Edward's Hospital Fund for London, held at St. James's Palace on June 27, the Duke of GLOUCESTER referred to the proposal to allocate a further £250,000 for grants during the next three years to mental and mental-deficiency hospitals serving the Metropolitan area. This would bring the sum total of the Fund's assistance to mental and mental-deficiency hospitals over a very few years to about £630,000. The three pioneer schemes sponsored by the Fund to facilitate the modern methods in the treatment of mental patients were approaching completion. A number of improvements recommended by the Fund's catering advisory service, and financed wholly or in part by the Fund, had recently been completed. The sum of £10,000 had been granted to the British Student Tuberculosis Foundation towards the cost of setting up a sanatorium at Mottingham Hall in the grounds of Grove Park Hospital for university students who had contracted tuberculosis. They would be able to continue their studies with the aid of tutors from the University of London while undergoing treatment.

Lord ASHBURTON, the treasurer, said that the Fund's income from investments and properties had risen by £16,000, which offset to some extent the fall in the purchasing power of money. A further £50,000 from the Nuffield Trust for the Special Areas had raised the benefaction from that source to £1,700,000. The Fund would benefit by £12,500 over the next seven years as the result of a new and covenanted subscription from Messrs. Marks & Spencer. It had been a good year for legacies, which had brought in £100,000.

Lord MCCORQUODALE, chairman of the management committee, said that the national training scheme at the Hospital Administrative Staff College was going well. The college could take care of the training facilities, but this was not enough. If the scheme was to be a real success the conditions offered must be such that hospital administration could hold its own in the competition in the universities for the right type of man, and the career structure such that, once trained, the men had reasonable opportunities of promotion. Meanwhile the eight students at the staff college had settled down very well. The eight trainees in Manchester University were being handled on somewhat different lines, and it would be interesting to compare the results in due course.

Sir ERNEST ROCK CARLING reported grants from the radiotherapy fund of £20,500 to the Royal Marsden Hospital and £3000 to St. Thomas's Hospital. The first was to finance new work in the hospital laboratories at The Downs, Sutton, in measuring the amount of radioactive substances taken in by human beings. There was no doubt that in the future there would be increased exposure to radioactive substances, and the work now being planned might be the means of preventing the ill health of whole populations in the future, as well as of treating those suffering from accidental over-exposure to radioactive elements. The grant to St. Thomas's resulted from an almost accidental discovery that the treatment of cancer by radiotherapy was more effective if given in a higher than normal concentration of oxygen. Research and treatment had gone on in an R.A.F. tank originally intended for testing the reaction of pilots to air-pressure. As a result of the Fund's grant it would be possible to build more comfortable conditions for the patients receiving this new form of treatment.

Parliament

Lung Cancer and Smoking

ON June 25, in the absence of the Minister, Mr. J. K. VAUGHAN-MORGAN, the parliamentary secretary to the Ministry of Health, made the following statement:

In its annual report, and more particularly in its special report on tobacco smoking and cancer of the lung, the Medical Research Council has advised the Government that the most reasonable interpretation of the very great increase in deaths from lung cancer in males during the past twenty-five years is that a major part of it is caused by smoking tobacco, particularly heavy cigarette smoking. The council points to the evidence derived from investigations in many countries in support of this conclusion, in particular to identification of several carcinogenic substances in tobacco smoke.

The Government feel that it is right to ensure that this latest authoritative opinion is brought effectively to public notice, so that everyone may know the risks involved in smoking. The Government consider that these facts should be made known to all those with responsibility for health education. The Minister of Education included in his recently published *Handbook for Teachers on Health Education* advice about the dangers of smoking and he is circulating copies of this statement to local education authorities and education authorities generally.

The Government now propose to bring these views to the notice of the local health authorities who are concerned under statute in the prevention of illness and who are responsible for health education as a means of prevention. Local health authorities will be asked to take appropriate steps to inform the general public and in this task they will have the assistance of the Central and Scottish Councils for Health Education.

Once the risks are known everyone who smokes will have to measure them and make up his or her own mind, and must be relied upon, as a responsible person, to act as seems best.

The Medical Research Council is at present supporting an extensive programme of work designed to discover the way in which tobacco smoke exerts its effect and the relative importance of other factors, such as atmospheric pollution, which may also play a part in the causation of lung cancer. The recent expansion of this programme has been greatly assisted by a substantial grant made in 1954 by a leading group of tobacco manufacturers. This sum was given to the Medical Research Council with complete discretion as to the choice of research projects to be supported and to the publication of results.

The work at present in progress consists largely of chemical and biological studies of the many different constituents of tobacco smoke and atmospheric pollution. In addition, surveys of the rôle of atmospheric pollution and of specific industrial hazards in the causation of the disease are being undertaken. Work along these lines is being supported in many centres in different parts of the country and the council has also established, as part of its own organisation, three new research groups in Exeter, London, and Sheffield, where long-term studies of different aspects of the problem are being carried out. Every opportunity will be taken by the Medical Research Council to pursue any promising new lines of research which may become apparent.

Mr. MARCUS LIPTON: May we have an assurance that the Government will not impose any restriction on reasonable expenditure by local health authorities in the publicity they want to undertake to let people know of the dangers of lung cancer? Will he also say whether, in the case of local health authorities that do not take appropriate action, measures will be taken to compel them to do what is necessary?—Mr. VAUGHAN-MORGAN: The publicity material will be supplied by the Central Council for Health Education and it will be purchased by the local health authorities, who receive an Exchequer grant of 50% of their expenditure. As to defaulting authorities, we will see how they get along.

Dr. REGINALD BENNETT: Will my hon. Friend bear in mind the possibility of his department encouraging the putting up of notices banning smoking in places of public assembly, in view of the fact that many who do

not smoke find themselves inhaling other people's smoke in large quantities in such places?—Mr. VAUGHAN-MORGAN: I am sure that that is a point which will be brought forcefully to the attention of all local health authorities.

Lady TWEEDSMUIR: Will my hon. Friend say what grant is given by the Government to direct research into this particular cause of cancer?—Mr. VAUGHAN-MORGAN: The Medical Research Council's expenditure on this particular item has risen substantially and now amounts to approximately £40,000 a year. That is quite apart from expenditure on cancer research generally.

Mr. RICHARD FORT: Would my hon. Friend point out to the health education authorities that local authorities have the power to stop smoking in cinemas and thereby to bring this country into conformity with almost every other civilised country in the world?—Mr. VAUGHAN-MORGAN: I am sure that all local health authorities will pay great attention to everything which has been said today.

Mr. J. A. LANGFORD-HOLT: My hon. Friend said that local health authorities are being asked to take appropriate steps to inform the general public. Do we infer from that that they are being asked to consider or to take no other steps in that direction, but merely to see that the public are informed?—Mr. VAUGHAN-MORGAN: That is their main duty, as the authorities responsible for the prevention of illness. The means by which they carry it out is for the moment for them to decide.

Progress Report on Gowers

The Government's withdrawal of the Shops Bill was, as he frankly admitted, the last dilatory straw which led Mr. ALFRED ROBENS to call attention in the House of Commons on June 25 to the delay in implementing the Gowers reports of 1949. He reminded the House that the reports covered the 12 million workers in shops and offices, hotels, restaurants, catering, indoor and outdoor entertainment, rail and road transport, agriculture, fishing, shipping, and domestic employment. An Act dealing with agriculture had been introduced in 1956, but the workers in the other trades were still inadequately protected by legislation. The Gowers Committee had commented on the vagueness of the cover offered to shop-workers, while office-workers had been completely neglected by all parliaments. They had to rely on the public health Acts, which were difficult to apply to the hundreds of thousands of little offices scattered up and down the country. In every recommendation made by the committee, he added, attention had been drawn to the lack of sanitary convenience in every industry they investigated. The Government had repeatedly given pledges that they would implement the reports. In his view, if they had any real intention of doing so, they would have found legislative time before now.

Mr. R. A. BUTLER, the Home Secretary, in his reply suggested that the Gower Committee's objective, taking their two reports together, was to ensure that no worker in non-industrial employment should be compelled by force of economic circumstance to put up with working conditions which were dangerous to life or limb or to general health, or which were inconsistent with human decency or dignity. The Government fully subscribed to those objectives. But in implementing the Gowers reports, we must remember that though by legislation we could prevent an employer from being bad, good employers were not necessarily made by law. Of course, we could not leave everything to good will because, human nature being what it was, good will was not always present. The Government believed that legislation was justified; three recent props of industrial welfare legislation, the Factories Act, 1937, the Mines and Quarries Act, 1954, and the Agriculture (Safety Health and Welfare Provisions) Act, 1956, had been passed under Conservative Governments.

The most important of the recommendations of the Gowers reports dealt with the safety of workers. The recommendations for the agricultural industry included such matters as protection against poisonous sprays and chemicals, provision of first-aid equipment, and powers for looking after dangerous machines. Under the Agriculture (Poisonous Substances) Act of 1952, regulations had been made laying down the precautions which must be adopted when using certain chemical substances. The regulations were revised as necessary to meet the constantly changing circumstances of what was new British farming practice. Ministers were helped by an advisory committee; they were also in touch with the chemical industry to ensure that before new chemicals were put on the market their hazards would have been assessed so that suitable precautions might be taken.

The 1956 Act actually went beyond the Gowers Committee's recommendations, because it enabled Ministers to make regulations covering a wide range of risks. The first regulations, those relating to provision of first-aid items by employers of agricultural workers, had already been made and would come into force on Aug. 1. Work was also in progress on regulations for the guarding of power take-offs, safe ladders, fencing of apertures and staircases, the guarding of fixed and portable machines and of circular saws, weights to be lifted, and measures to protect children. The chief safety inspectors in London and Edinburgh had been in their posts now some months, and the appointment and training of the other officers forming the inspectorate were taking place. The Mines and Quarries Act had come into operation on Jan. 1, and under it a regulation had already been implemented, prohibiting the employment of boys below the age of 16.

Turning to the Gowers Committee's second report, dealing with the terms of employment of young persons, Mr. Butler pointed out that legislation already existed to limit working hours in jobs where long hours would do special harm. Thus, young people who worked in factories, mines, quarries, the retail trade, and occupations such as messenger boys, van boys, and cinematograph operators were already protected. Of the young people who were not protected the great bulk worked in offices. Their working hours depended on the working hours of adults, and in recent years there had been a tendency towards shorter hours, from which young people had benefited like everybody else.

In such places as offices, warehouses, and shops, safety was not so important a consideration as it was in factories where potentially dangerous machinery was in use. In offices it was the general health and comfort of workers that had to be safeguarded by adequate lighting, ventilation, sanitation, and so forth. Few employers nowadays were blind to these problems. Where an employer failed, as some undoubtedly did, it was not so much because they did not care; it was because their work-places were in old buildings with a limited life. Here we were up against a problem which was quite beside that of legislation. We had to strike a balance between imposing severe economic burdens by insisting on new buildings and so driving people out of business, and encouraging investment in this sort of building. He would not and could not give pledges about future legislation, but he reaffirmed that the ideals which inspired the Gowers Committee remained those of the Government.

Children's Beds

The difficulty of reconciling principle and practice was once more demonstrated in the debate in the House of Lords on June 26 when Lord BALFOUR OF BURLEIGH challenged the proposal to use the Princess Louise Hospital for adults instead of children. Lord Balfour, who is an alderman of the royal borough of Kensington, which the hospital serves, pointed out that it was a modern well-equipped hospital of 76 beds with specialist services, including a cerebral-palsy unit, and a nurses' training school. It had been built with a fund of £80,000 which was raised locally, and it served a dense working-class district. It belonged to the St. Mary's Hospital group, and Lord Balfour agreed that this teaching hospital was in difficulty because it had too many children's beds. The borough of Kensington had suggested that the Princess Louise Hospital should be transferred to the North West Metropolitan Regional Hospital Board and that, to provide adult beds needed by St. Mary's, this board should close some children's beds elsewhere. Was it sensible, as St. Mary's proposed, to convert the most modern children's beds in the area? He also felt that the proposed conversion would be a breach of the agreement made with St. Mary's at the time of the amalgamation of the hospitals before the start of the National Health Service. The case had been submitted to the Minister of Health, and Lord Balfour could hardly believe

that the Minister would not decide to keep the Princess Louise as a hospital for children. But if by any misfortune he decided against this, Lord Balfour thought it highly likely that the decision would be challenged in the courts under section 6 (4) of the National Health Service Act, which said that the Minister should use property as far as practicable so that the objects for which it was used immediately before the appointed day were not prejudiced.

Lord WEBB-JOHNSON offered Lord Balfour his support, and reinforced it by citing the conclusion of the pædiatric committee of the Royal College of Physicians that a special hospital rather than a general hospital offered the best service for children. But he was sympathetic to the difficulties of St. Mary's and he was sad to see a great teaching hospital driven to such straits. In his view its needs could be met only by a comprehensive plan of development, and he urged the Minister to back a bold plan worthy of St. Mary's history.

Lord COHEN, who is a member of St. Mary's board of governors, explained that the apparently reasonable offer of alternative beds for adults at a hospital under the regional hospital board would not in fact be a satisfactory solution, for St. Mary's would not have control over the admission of patients and would therefore be unable to provide suitable clinical material for the medical school. Turning to the lessening need for children's beds he said that in St. Mary's group there was a waiting-list of 1580 adults compared with only 320 children.

Lord COTTESLOE said that, as chairman of the North West Metropolitan Regional Hospital Board, he knew that there were 350 beds for children within reasonable reach of North Kensington, and the occupancy figures made it clear that a considerable number could be closed without harm. St. Mary's group had 160 pædiatric beds and the case for a reduction seemed strong; but the Princess Louise was a good hospital, giving good service to a local community, and his board would be prepared to take it over and use it as the pædiatric department of the adjacent St. Charles' Hospital. The children's beds at St. Charles', and possibly some at Paddington General Hospital, could then be closed. This would reduce the number of children's beds in the area, and give the Princess Louise the benefit of integration with a large general hospital; but, as he readily admitted, it would not give St. Mary's additional beds under their own control. Though his board would be prepared to offer St. Mary's additional beds for teaching, they could not meet this requirement.

Lord MORAN suggested that basic principles on which the efficiency of the National Health Service depended were at variance with local loyalties and feelings. Today the incidence of children's diseases, like that of infectious diseases and tuberculosis, was happily falling rapidly. If it was agreed that there was a surplus of children's beds, the only question that remained was which should be closed. And here he asked the House to remember the obligation of St. Mary's to provide clinical facilities for the teaching of students. Unless the hospital had administrative control of beds it could not control the cases admitted, which was half the secret in getting suitable clinical material. St. Mary's was already saturated with beds over which it had no control, and further beds under the regional board would be no solution to its problems.

Furthermore Lord Moran believed that a small hospital was difficult to make efficient and impossible to make economic. If we were going to economise in the health service—and if we did not he did not know where we were going financially—we must reduce the number of hospitals and have large units. Medical opinion was, he thought, pretty evenly divided on the question whether it was better to treat children in special hospitals or in a large hospital. He had no doubt that the future lay with the large general hospitals and that children must be treated there because of the accessory departments. The clinics at the Princess Louise could easily be put up in another hospital. Indeed in his view it was unsound to have these highly developed clinics in small hospital units.

The health service, he concluded, had not been inaugurated because the doctors wanted it. They were told that the country wanted it. If that were so, responsible people should seek to strengthen the hand of the Minister of Health in his unpopular task of coördinating the hospital service. People round a hospital invariably said that it should function as it began and never change. If local needs and local loyalties were always to take charge he would despair of ever coördinating the service.

Lord STRATHCLYDE, replying for the Government, said that medical science was constantly changing and with it the need for various types of accommodation. The use of hospital resources must have regard to these changes. The Minister recognised his obligation to secure as far as practicable that the objects for which any hospital was used before the appointed day were not prejudiced. But it seemed to Lord Strathclyde that the operative words were "as far as practicable." The Act did not, and could not, mean that the Minister was required to maintain for ever unaltered the objects for which hospitals were used. He was no less bound by the Act to see that the available hospital resources were used to the best interest of all who needed them.

It was the responsibility of St. Mary's board of governors to provide a proper balance of facilities for undergraduate clinical teaching. They had too many children's beds and inadequate facilities for teaching obstetrics and gynæcology. The University of London had decided to establish a chair of obstetrics and gynæcology at St. Mary's, and the board, after long consideration, decided that the only way in which they could provide hospital facilities for the chair was by making the Princess Louise an adult hospital. Strictly speaking it was within the discretion of the board to change the use of their hospitals; but in this case they had consulted the Minister, who would give the arguments put forward on both sides in the debate his earnest consideration.

Lord BALFOUR OF BURLEIGH, in closing the debate, said that though a good case had been made for the conversion of some children's beds to adult beds, the arguments that the proper beds to convert were the most modern and urgently needed beds in Kensington had been a good deal less convincing.

Prescribing in Scotland

A committee has been set up by the Secretary of State for Scotland with the following terms of reference:

To inquire into prescribing practice in the general medical services and in the hospital and specialist services in Scotland, with particular reference to the factors governing costs.

The members are:

J. B. Douglas (chairman), Prof. Stanley Alstead, F.R.C.P., Prof. R. B. Hunter, F.R.C.P.E., J. C. KNOX, M.B., E. V. Kuenssberg, M.B., J. R. Langmuir, M.B., D. McCall, PH.C., J. O. McDonagh, M.B., E. G. Oastler, F.R.C.P., Prof. T. B. Smith, Q.C., J. C. Stewart, C.A., and A. Stewart Henderson, M.B.

QUESTION TIME

Women Candidates Only?

Mr. JOHN MACLAY, the Secretary of State for Scotland, in a written answer, said that after meeting a deputation on June 14 and considering their representations on the appointment of a consultant physician at the Bruntsfield and Elsie Inglis Hospitals, Edinburgh, he felt bound to maintain his previous decision [1] that he should not be justified in intervening in a matter which had been entrusted under statute to the discretion of the regional board.

Notification of Rubella

Dr. EDITH SUMMERSKILL asked the Minister of Health whether he would consider adding German measles to the list of notifiable diseases.—Mr. VAUGHAN-MORGAN replied: My right hon. Friend has considered this and has been advised that since it cannot be effectively controlled, there is no epidemiological purpose in making it notifiable. Dr. SUMMERSKILL: Is the hon. Gentleman aware that many authorities now believe that there is a relationship between German measles and congenital defects? In view of this, surely there should be a national record of German measles in this country?—Mr. VAUGHAN-MORGAN: I am advised that there is evidence that German measles does have certain consequences in certain conditions, but I am also advised that in our present state of knowledge the degree of risk cannot be assessed with certainty. Dr. SUMMERSKILL: If there is a chance of that amount of

1. See *Lancet*, 1957, I, 539.

danger about which we all know, surely the cost of compiling a register is very small, compared with the danger of allowing matters to continue as they are without the knowledge which could be obtained from a register ?—Mr. VAUGHAN-MORGAN : I think we have to bear in mind the form which this disease takes, and it is no good making it notifiable if such instructions may be disregarded.

Leprosy in the United Kingdom

There are 239 cases of leprosy recorded in the United Kingdom. In the years 1952 to 1956 there were 68, 34, 34, 19, and 36 fresh cases respectively.

Medicine and the Law

Residue or Endowment of Bed

BY her will dated Oct. 1, 1943, a testatrix left all her residuary estate to her trustees " upon trust for the Cumberland Infirmary, Carlisle, to be applied towards the endowment of a bed in the . . . Infirmary in memory of " her sister and herself. On Dec. 30, 1947, the testatrix died. On July 5, 1948, under the National Health Service Act, 1946, the Cumberland Infirmary became vested in the Minister of Health and the management of it passed to the East Cumberland hospital management committee. Before the Act came into force the governors of the Cumberland Infirmary had been prepared, in return for a gift of £1000 or upwards, to name a bed as a memorial to the donor. In 1953 the East Cumberland H.M.C. told the surviving trustee of the will that that practice had ceased when the management of the hospital passed to them ; that they had power to accept gifts on conditions, but that they could not specify what minimum sum was required for a bed to be named as a memorial : they also said that the annual cost of maintaining a bed in the hospital was about £700. The question for the decision of the Court was whether the trustee of the will should transfer the whole of the residue, which amounted to £6100 cash on deposit, to the committee or only such part of it as was necessary to endow a bed.

Mr. Justice UPJOHN said that in the first place there was an out and out gift of residue for the infirmary, and the testatrix had directed that the treasurer of the infirmary was entitled to give a receipt for the whole of it. The gift, however, was for a certain purpose—namely, for endowing a bed. It was settled law that a gift to endow a bed only meant that the gift was to be invested by the relevant hospital, the income to be used for the general purposes of running the hospital, and the hospital undertaking to comply with the condition in the will of naming a bed. There was no express provision in this will about naming a bed but that could readily be implied. The H.M.C. were willing to undertake to treat the money as capital and to apply the income for maintenance purposes and to put up a plaque near a bed in memory of the testatrix and her sister. His Lordship could not agree with the argument for the next of kin that it was gift of only so much of the residue as was required to name a bed in accordance with the practice of the hospital before the National Health Service Act came into force, and that it was therefore a gift of only £1000. It was a plain gift of the whole of the residue ; even if it were not, the surplus would have to be applied cy-près. It was therefore a valid gift of the entirety of the residue to the H.M.C., they undertaking to treat it as capital and to apply the income for the general purposes of maintaining the hospital and naming a bed in memory of the testatrix and her sister. His Lordship made a declaration to that effect.

Re Barnfather deceased : Reed *v.* East Cumberland hospital management committee and Others. *Chancery Division* (Upjohn *J.*) June 25, 1957. M. Nesbitt (Pettiver & Pearkes for Jackson & Saul, Carlisle) ; T. A. C. Burgess (Charles Russell & Co. for Harston & Atkinson, Carlisle) ; Denys Buckley (Treasury Solicitor) ; J. A. Gibson (Moodie, Randall Carr & Miles for J. F. W. Ritson, Wigton, Cumberland).

P. PRICE
Barrister-at-Law.

In England Now

A Running Commentary by Peripatetic Correspondents

THE problem of how to feed one's guests single-handed within an hour or so of returning from the laboratory, and still appear calm and glad to see them, is easily solved at this time of year. What could be nicer than salmon mayonnaise followed by strawberries and cream? It can all be prepared beforehand, well almost all, but what about the mayonnaise ?

For years we have waited vainly for a 58th variety fit to anoint salmon, but there is still nothing for it but to emulsify egg-yolk and olive-oil drop by drop.

It only needs a little patience . . . it is not difficult . . . the French do it all the time . . . I don't know why people make a fuss about it, its thickening beautifully. Good, that's John's car, I wonder if he has remembered the cigarettes. Oh dear, it seems to be thinning, I must have added too much oil, yes, its curdled. Oh well, it won't take long to add it to another egg-yolk and John can hold the fort if anyone arrives. . . . There's the bell, I wonder who it is . . . I must go *slowly* this time . . . why does one have to do this when it's so hot, it should be eaten in the depths of winter. " I shan't be long darling . . . yes, I should love a drink down here."

I don't wonder the French believe that no menstruating woman can make a mayonnaise, the mental trauma is terrific. . . . Doing Wassermann reactions is child's play compared with this . . . Wassermann reactions . . . dropping . . . I must be crazy to pour the oil out of a jug. What one needs is a funnel, a short piece of rubber tubing, and a screw-clip. The funnel could be supported on the plate-rack if I used the cooker as a table. One couldn't add the oil too quickly accidentally.

It works. Do come to dinner, it's no trouble at this time of year and we shall be delighted to see you.

* * *

One feature of medical travel was not mentioned by your peripatetic professor (June 22, p. 1291). In the days of the Grand Tour when English gentlemen travelled leisurely through Europe, laundry appears to have been no problem. The situation has changed with the modern sortie into the New World and its brief visits to different centres each lasting no longer than three or four days. It has been further aggravated by air travel and the need to travel light. The solution came with nylon, its derivatives, and rapid drip-drying. Five to ten years ago shirts of these materials could only be obtained over in the States ; there ensued a new sport of shirtmanship. " What do you think of this 'Orlon,' old man ? " from the returning traveller would score heavily unless countered by " Well, I find 'Dacron' better wearing." Now our own textile manufacturers have developed non-iron cotton shirts and we no longer have to endure the steamy discomfort of nylon and the clinging irritations due to its static charges.

Though it is simple enough to wash one's 'Terylene' hose, nylon pants, and non-iron cotton shirt each night before retiring, there are anxious moments. Will one's American host with whom a room is to be shared at Palmer House be shocked at the sight of a shirt suspended from the shower over the bath ? Fortunately he is not, for he does exactly the same himself. And the habit dies hard, for it seems convenient to continue the practice at home, where hooks have now been installed over the bath. Now as I relapse into bed at night I reflect on the prophetic wisdom of my nanny who would scold me with the cry of " Cleanliness is next to godliness." Now like a good boy I say my prayers *and* do my laundry.

* * *

My godson, aged twelve, had been examined and interviewed by a consultant pædiatrician. During the homeward journey the boy suddenly declared " Either that man's mad or I am. He asked me if I was worried about my health. Even if I was I wouldn't tell a complete stranger."

Letters to the Editor

"STRESS" AND MENTAL DISORDERS

SIR,—It has become fashionable to assert that there is an increase in the incidence of mental disorders and that the cause of this is the "increased stress of modern life." No scientific evidence is produced to substantiate either of these assertions, and it is high time that they gracefully faded out.

The increased figures of admissions to mental hospitals and of attendances at outpatient clinics are sometimes quoted in support of the first assertion. It seems to be forgotten that before 1930 there were no legal provisions for the treatment of mild mental disorders in the vast majority of psychiatric institutions, and that very few outpatient clinics were available. But this does not mean that neuroses and psychosomatic disorders did not exist. Such cases were then almost exclusively treated by general practitioners and by general physicians, though these illnesses may have masqueraded under some such title as "appendicitis" or "colitis"—as Axel Munthe so well described.

In favour of the theory of increased stress we hear talk of competition in occupational or social ambitions, of jealousies, envies, or hatreds in interpersonal relationships. But was there ever a society in which all such stresses did not exist? The stresses between parents and children, between the married and their in-laws, between employer and employee, have always existed, and there is nothing to prove that these are more intense today than they used to be. Indeed one could quote arguments which favour the theory that stresses in many fields have diminished. The Victorian patriarchalism has certainly become much less severe, and the neurotic Barretts of Wimpole Street are unthinkable today. We are beginning to dwell in what promises to be a complete Welfare State, in which the stresses of poverty and unemployment are vanishing; we have sick benefits and pensions; we have less to worry about in many respects.

Psychiatrists should inform the inquiring layman that life is a battle, that it involves many unavoidable stresses, and that the healthy attitude is to enjoy the fight. As things are at present, some of the so-called mental-health propaganda is instilling a phobia for the inevitable stresses of life.

Park Prewett Hospital,
Basingstoke. I. ATKIN.

CONTROLLED TRIALS NEEDED

SIR,—All must agree with the general theme of your recent annotation (June 15). It is perhaps justifiable, however, to point out that the value of the new treatment of hypertension, by forced reduction of blood-pressure, is no longer wholly uncontrolled. Without treatment the victims of the "malignant" phase are known to die usually within a few months. Here, then, the control is good, and here the results of hypotensive therapy, judged by the ultimate criterion of survival, have been shown to be excellent. With severe hypertension short of "malignancy," the evidence of controlled clinical observation points decisively in the same direction.

Admittedly, we have as yet no control with uncomplicated hypertension. Nevertheless, the findings of the life-assurance companies already must lead us to suppose that any sustained rise of arterial pressure presents a grave long-term threat, and this, be it noted, in consequence of that very same mechanism of vascular damage that we can see halted in its later stages by the new method. Here too, then, we may now reasonably hope to be able to delay disability and prolong life. As you say, however, judgment on this enticing prospect must await the outcome of trials planned many years ahead.

Blackpool. I. McD. G. STEWART.

ANTICOAGULANT TREATMENT FOR CORONARY DISEASE

SIR,—Post-mortem examination of patients with cardiac infarction who have failed to respond to treatment, or who have been considered "mild" and from whom anticoagulants have been accordingly withheld, or who have had a hæmorrhage—a signal for stopping this treatment—a consideration of such cases may cause one to "doubt the doubters." A small infarct involving the inner lining membrane of the chambers of the heart will encourage the formation of a mural thrombus. In the absence of anticoagulant treatment, or with the premature conclusion of this treatment, the mural clot may shed large or small particles which may be arrested in the pulmonary artery (as is admitted), but released particles may also be arrested in brain arterioles or arteries, in the arteries of the upper or lower limbs, or in other even more inaccessible situations. These embolic complications are a grave menace and are almost completely prevented by careful and continued anticoagulant therapy.

The point I would like to make is that even the so-called "mild" cases may disseminate emboli. The case for anticoagulant treatment of even "mild" cases seems to me to be very strong. The complication that hæmorrhage from a small vessel in the myocardium may be encouraged by anticoagulants is genuine, but the danger appears to be less than the danger from embolic dispersion if the drug is withheld.

St. Margaret's Hospital,
Epping, Essex. FRANK MARSH.

ST. LUKE'S TIDE SERVICES

SIR,—Since the National Health Service came into operation, the old and well-established practice of observing Hospital Sunday as a day when Christian congregations might be kept in touch with the work of hospitals up and down the country has tended to fall into abeyance.

There is, however, a growing practice of holding special services at St. Luke's Tide when local divisions of the British Medical Association or representatives of the profession in the locality are invited to take part in services either on the Sunday afternoon nearest to St. Luke's Day, on the eve of St. Luke, or at one of the regular morning or evening services, when a medical man is invited to address the congregation.

The Churches' Council of Healing, which comprises representatives from the churches associated with the British Council of Churches, from the British Medical Association, as well as from the Guilds of Healing and a number of medical fellowships, was initiated by Archbishop William Temple to promote greater coöperation between Medicine and the Church and to unite informed and convinced Christians in common action in the field of health and healing.

From time to time the council receives invitations from churches to provide medical speakers for special services, and to meet this demand it is setting up a panel of doctors willing to preach the sermon, read the lesson, or otherwise assist in such services.

As chairman of the council I shall be glad to hear from doctors willing to participate in this enterprise, and shall be grateful if any who are interested will communicate with me at the Churches' Council of Healing, 10, Eaton Gate, London, S.W.1.

It is hoped that in the course of the next few years the practice of holding such services in connection with the work of hospitals and of the medical profession may develop and thereby serve to promote a revival of an excellent custom, and focus interest on the spiritual factor in health and recovery.

Bishop's House,
Lichfield, Staffs. STRETTON LICHFIELD.

THE NEWBORN INFANT'S OXYGEN-SUPPLY

SIR,—While we are grateful for your leader of June 29 we would like, for the sake of completeness, to re-emphasise the evidence in favour of a high cardiac output (stroke volume) being a factor in the erection of pulmonary capillaries at or immediately after birth. There is the cine-radiographic film of Lind and Wegelius showing the startling diminution in the heart size during the first 2 or 3 breaths and the finding of high caval venous pressure in premature babies who do well with respiratory difficulty. Clearly if a high cardiac output is normally necessary and more necessary in asphyxia with increased peripheral vascular resistance, a blood volume which can be varied by as much as 47% of the expected total will be a considerable factor in maintaining this cardiac output.

Lastly, we are not clear that hyaline membrane and all of the pulmonary syndrome of the newborn are the same thing, for ultimately the diagnosis of hyaline membrane is histological and some infants suffering from the pulmonary syndrome live. And it should be borne in mind that a histological appearance may have several causes.

Department of Child Welfare, University College Hospital, London. R. E. BONHAM CARTER MAVIS GUNTHER.

THE ARCHITECTURAL FUNCTION OF THE PULMONARY CAPILLARIES

SIR,—I must point out a minor inaccuracy in Dr. Bonham Carter's article (June 22).

The pulmonary circuit is not an electrical one, hence Ohm's law cannot be said to apply. The correct formula is due to Poiseuille for the flow of liquid through a capillary:

$$\frac{V}{t} = \frac{\pi r^4 P}{8 l \eta}$$

where t is the time required for the volume V of liquid of viscosity η to flow through the capillary of radius r and length l, under pressure P.

It must be fascinating for the student of analogies to find an electrical circuit used to exemplify the flow of liquid through a tube!

Mental Hospitals' Group Laboratory, West Park Hospital, Epsom. J. KEITH CARTER.

TOBACCO-SMOKING AND LUNG CANCER

SIR,—The report of the Medical Research Council on tobacco-smoking and cancer of the lung can give us an opportunity to survey our knowledge of cancer and to assay its value.

It is a melancholy thought that hundreds of research-workers spending hundreds of millions of money have been at work for well over thirty years on this problem and at the end of this period we have advanced so little, if at all. The very volume of money and effort has built up an organised research which is no longer original. Its very bulk forces it through the well-worn channels.

To one who has been in practice for nearly thirty years the theory that cancer is, in its essence, a tumour caused by a carcinogen is most unsatisfactory. Carcinogens are laboratory factors. We see in practice a large number of cases of cancer but the cases where a carcinogenic factor can ever be surmised, let alone proved, are nil or infinitesimal.

Surely cancer is not primarily a tumour; the tumour is a symptom. In practice all have seen cases with a very small tumour and very severe cancer symptoms and, on the other hand, cases with a large tumour and the very minimal symptoms; often we diagnose or suspect cancer before the tumour is discoverable.

Two quotations from the report are of interest: "... it must be borne in mind that a very long period, 20 years or more, may elapse between exposure to a carcinogenic agent and the production of a tumour." And "... five substances have already been found which are known to be capable in certain circumstances of causing cancer in animals."

Thirty, forty years of work and that is the quality of our harvest.

Let us hope that the self-interest of the tobacco trade will separate the grain from the chaff of our research and open up new avenues of attack.

The report admits that we have not proved the presence of a human carcinogen in tobacco-smoking. Surely we must admit that it is a possibility that subjects with carcinoma of the lung smoke heavily because they derive some benefit, either real or imaginary. Many people suffer from carcinoma of the lungs; some are smokers and some non-smokers; some consider that they derive benefit from smoking and are claimed as heavy smokers. Surely, this is just as correct statistically as the conclusions of the Medical Research Council.

Petworth, Sussex. W. A. BALL.

SURGERY OF CHRONIC PANCREATITIS

SIR,—In the operative treatment of chronic pancreatitis, Prof. Ian Aird (June 8) has found that "retrograde pancreaticojejunostomy" (implanting the body or the neck of the pancreas, after transection, into the jejunum) has been more satisfactory than "caudal pancreaticojejunostomy" (amputating the tip of the tail of the gland and implanting the cut end into the jejunum). In none of his cases had it been convenient to implant the tail of the gland into the jejunum.

Professor Aird describes the tail of the pancreas as really very short, being that part of the gland which lies between the two layers of the lienorenal ligament. It is of some significance surgically, apart from pancreaticojejunostomy, for operations involving the upper left quadrant of the abdomen, in particular splenectomy, may be associated with damage to it. This may cause liberation of pancreatic ferments, with resulting fat necrosis and a lowered resistance to infection, predisposing to subphrenic inflammation. The descriptions given by different authorities of the left extremity of the pancreas are found to vary considerably. The tail of the pancreas is described as: an abrupt blunt ending, but sometimes elongated and narrow[1]; narrow, usually lying in contact with the inferior part of the gastric surface of the spleen[2]; the pointed and free left extremity of the body[3]; and the thickened rather than attenuated left end of the pancreas.[4]

In view of these varying accounts, 38 specimens of the lateral end of the pancreas were recently dissected in the Anatomy Department, Edinburgh University, through the kind interest of Prof. G. J. Romanes. Of these specimens, 17 were found to have a definite tail, as contrasted with the rest of the organ.

4 of these tails were triangular and tapered rapidly to a point; 8 were prismatic in shape with sharp or rounded borders and clearly distinct from the body of the gland on account of their smaller dimensions. In 2 the tail was a short blunt tag separated from the body by a vascular groove, and in 2 a flattening in the anteroposterior plane constituted a distinct tail. In 1 case there was a bifid tail, with no vessel or other structure lying between the two portions.

In 17 specimens there was no narrowing of the body of the pancreas appreciable enough to be termed a "tail."

In 8 of these the body ended with a rounded contour, and in 9 the body ended abruptly as if cut off by a scalpel.

1. Cunningham's Text-Book of Anatomy. Edited by J. C. Brash and E. B. Jamieson. London, 1943; p. 645.
2. Gray's Text-Book of Anatomy. Edited by T. B. Johnston and J. Whillis. London, 1946; p. 1409.
3. Buchanan's Manual of Anatomy. Edited by F. Wood Jones. London, 1949; p. 803.
4. Jamieson, E. B. A Companion to Manuals of Practical Anatomy. London, 1950; p. 646.

In 4 specimens the body actually expanded at its left extremity, forming a flattened enlargement—a marked contrast to some of the narrow pointed tails previously encountered.

We also found that the tail of the pancreas proved as variable in its relation to the spleen as it was in shape. In 19 it was closely applied to the spleen, lying on the pancreatic impression inferior to the hilum. The area of contact between the pancreas and spleen was very large in 1 case, extending from a point near the upper margin of the hilum to the lower pole of the spleen. In contrast, in 8 cases the pancreas just touched the spleen, and was easily separated with the finger when lifting the spleen anteriorly. In 11 cases the pancreas did not reach as far as the spleen, the gland ending in the lienorenal ligament, or on the surface of the kidney. In 1 instance, the end of the pancreas was $1^1/_2$ in. from the spleen, as in the short pancreas illustrated by Grant.[5]

The left end of the pancreas is therefore a somewhat variable structure, both in its shape and in its relationship to the spleen, and Professor Aird's "retrograde pancreaticojejunostomy" would appear to be more satisfactory than "caudal pancreaticojejunostomy." Careful technique, such as described by Wilkie,[6] Learmonth,[7] and Cattell [8] is also advisable when performing splenectomy in order to avoid damaging the tail of the pancreas.

Edinburgh. JAMES A. ROSS.

CIRCUMCISION WITH BONE-CUTTER

SIR,—The correspondence on circumcision initiated by Dr. Skeggs (June 8) illustrates the fundamental contrast between Dogma and Reason—between the man of religion (who knows he is right) and the man of science (who knows he is wrong). There remains some doubt as to which is the more practical philosophy. The rabbi circumcises with an inward serenity and an outward simplicity, confident that he is doing the right thing, at the right time, in the right way. The doctor argues interminably as to how the operation should be performed, when it should be done, and whether, indeed, it should ever be done at all.

My own contribution, rather a futile one, to this evergreen problem was to use—for a time—an instrument designed to cut neither flesh nor bone, but ordinary common or garden wire. It attracted me, partly because of its powerful crushing action, but mainly because of its singularly appropriate name. It can be obtained at any reputable ironmonger's and is catalogued under the heading: "Nippers, end-cutting, double-toggle."

South Mymms, Herts. V. J. DOWNIE.

A THOUSAND CHAMBER POTS

SIR,—In common with many others who are concerned with the care of the chronic mental patients, we wait with impatience for the day when the recommendation of the Royal Commission will be enacted and the present emphasis on custodial care will give way to a therapeutic attitude to the problem.

Meanwhile, within the present system and without expense, much can be done to humanise and civilise the conditions of many thousands of patients if it is recognised that degradation is not an essential feature of chronic mental illness.

We recognised that one of the most disgusting aspects of hospital life was the chamber pot and the morning slop parade, and it was decided that patients could be allowed normal lavatory facilities. Side-rooms and dormitories have been left open, lavatories made accessible, and the chamber pots removed.

The many complications including wet beds predicted by the pessimists have not occurred and there is a marked net gain in upgrading the wards.

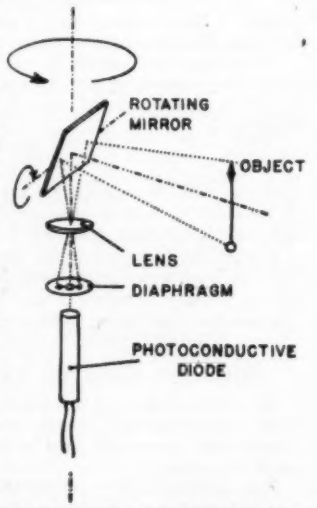
An administrative problem has, however, been produced. How does one dispense with 1000 unwanted chamber pots? The suggestions so far have not been very helpful.

Stanley Royd Hospital, Wakefield. D. E. MUNRO
C. B. WILLIAMSON.

TOWARDS TELEVISION GASTROSCOPY

SIR,—Various systems have recently been suggested to replace the present rigid gastroscopes with smaller flexible units.[1–3] The final solution of this problem might involve an electronic scanning system, but I should like to point out the possibility of using a mechanical-scanning principle, with which we have made some preliminary experiments although no complete unit has yet been built.

The angular or "horizontal" scanning is produced by rotating the whole pick-up head of the television sonde. The "vertical" scanning is obtained from a rotating mirror in front of a lens. The image is focussed on, and moves over, a diaphragm with a pinhole. The hole determines the size of the image elements and selects the light from each of them during the scanning. The transmitted light falls on a photoconductive element (e.g., germanium or cadmium sulphide) or a phototransistor. After amplification of the photocurrent outside the patient, the image can be observed on a television monitoring screen.



Optical system of the television pick-up head for endoscopy.

The cable to the pick-up head contains electrical leads to the light source and to the photoconductive element, a mechanical transmission for focussing the image on the diaphragm, and possibly an air-inlet hose for filling the stomach or the intestinal tract. The rotation of the mirror can be synchronised with the rotation of the whole pick-up head. This can be done by a gear system between a fixed flexible tube and the inner rotating tube carrying the leads. Other possible ways to rotate the mirror are by means of a tiny air-turbine or an electric motor.

Colour transmission can be obtained if three-coloured mirrors are used rotating around the same axis. To eliminate the need for an intense light source, the filament from the incandescent lamp can be focussed on the particular row of image-elements scanned by the mirror; or, alternatively, a system can be constructed where a point source of light scans the object either simultaneously with the mirror pick-up scanning, or without any pick-up scanning in a fashion similar to the 'Vitascan' system used in colour television.

Although the use of mechanical moving parts is a disadvantage in an instrument for routine work, the system described has the advantage that it can be constructed with electronic components now available. The

5. Grant, J. C. B. A Method of Anatomy. London, 1952; p. 263.
6. Wilkie, D. P. D., Miles A. Operative Surgery. London, 1936; p. 554.
7. Learmonth, J. *Brit. med. J.* 1951, ii, 67.
8. Cattell, R. B., Warren, K. W. Surgery of the Pancreas. Philadelphia, 1953; p. 214.

1. Wallman, H., Rosengren, B. *Lancet*, 1956, ii, 1311.
2. Stanford, B. *Ibid*, 1957, i, 101.
3. Frank, W. E. *Science*, 1957, **125**, 871.

mechanical dimensions (the pick-up head is about 5 cm. long and has a diameter of about 1 cm.) would allow inspection of regions of the intestinal tract inaccessible to other optical instruments. The property of certain photoconductive materials of having a large inherent current multiplication is of advantage in that they require less light intensity than other suggested pick-up systems. The slow scanning-speed (a few seconds per turn of the pick-up head) might be the greatest disadvantage, since it probably necessitates the use of a storing system (e.g., a colour-photographic recording) for detailed inspection of the image. The recently developed image-storage tubes (e.g., Hughes 'Tonotron,' or R.C.A. Type 6866 'Display Storage Tube') could also be used for the same purpose if the images on three tubes equipped with appropriate colour filters were optically mixed.

Karolinska Institutet,
Stockholm 60, Sweden. BERTIL JACOBSON.

STEATORRHŒA AND HYPOPARATHYROIDISM

SIR,—Dr. Salvesen, in his letter of June 15, has slightly misunderstood my own communication. I attempted to point out merely the *coincidence* of steatorrhœa and hypoparathyroidism, whether the latter was primary, secondary, or pseudo. The actual relationship of the two states is another matter, and Dr. Salvesen's own theory (of secondary parathyroid failure from undernutrition of the gland) indicates one possible connection. Unfortunately not all cases of the "syndrome" show *idiopathic* hypoparathyroidism, since some do not respond to parathyroid extract (e.g., my own case).

University of Cape Town. W. P. U. JACKSON.

SIR,—Professor Salvesen seeks to draw a distinction between *idiopathic* hypoparathyroidism associated with steatorrhœa and *secondary* hypoparathyroidism due to steatorrhœa. It is not clear, however, how this distinction can be made, or what reasons he has for thinking that they are not one and the same condition.

Gardiner Institute,
Western Infirmary,
Glasgow, W.1. B. E. C. NORDIN.

ACUTE SUPPRESSION OF URINE AND LIVER FAILURE ACCOMPANYING ECLAMPSIA

SIR,—The interesting account by Dr. Saltoun and Dr. Kinn (June 22) suggests that readers might be interested in a case recently under my care in the small obstetric unit in the Sir Henry Elliot Hospital, Umtata, C.P.

Postpartum convulsions developed in a multiparous Tembo native soon after returning to her ward following a normal parturition. The convulsions seemed typically eclamptic, were severe, and were followed by coma.

The blood-pressure was raised (diastolic over 100 mm. Hg) There was no past history and no antenatal examination had been made. She was given paraldehyde 5 ml. intramuscularly; some 12 oz. of black urine was collected soon afterwards. It contained very scanty erythrocytes, no pus cells, a few casts, and albumin; the colour was due to hæmoglobin. Blood examination was negative for malarial parasites; Wassermann reaction was negative. There is no malarial fever in the Transkei.

A colleague, Mr. I. R. Ross, advised Bull's diet.[1] (400 g. dextrose, 100 g. arachis oil, acacia q.s. to 1 litre of water, given slowly through a Ryle's tube every 24 hours). Nothing else was given at all, except a few teaspoonfuls of cold water occasionally to comfort the patient, who coöperated excellently. This was continued for 3 days, before the secretion of urine began to return, slowly at first but soon more rapidly: the daily volume was recorded and an equivalent quantity of extra water was allowed, and the glucose and oil mixture given by mouth; this induced nausea if not given in very small amounts slowly and at intervals.

Soon there was an astonishing diuresis of up to 18 pints a day of colourless clear urine of specific gravity about 1·005 or less at first. She recovered rapidly, and we had some difficulty in persuading her to remain in hospital; we feared that grave electrolyte imbalance might develop after return to her village. Urine chlorides were tested repeatedly and never fell below a normal minimum. We did not know what was happening to her potassium store, so Hartmann's solution was given, as well as a litre of whole blood.

The baby lived, and had almost entirely breast-feeding by the time they left hospital. There was no pyrexia, and therefore no antibiotic was given. Both the patient and her relatives denied all history of epilepsy, and she had none of the scars of injury and burns so characteristic of this affliction amongst primitive peoples.

Hæmoglobinuria is a known complication of eclampsia.[2]

London. R. W. NICHOL.

1. Bull, G. M., Jockes, A. M., Lowe, K. G. *Lancet*, 1949, ii, 229.

AN EFFECT OF MEPROBAMATE WITHDRAWAL IN RATS

SIR,—Swinyard et al.[3] report hyperexcitability in mice from which meprobamate was suddenly withheld after sustained administration. They refer to reports of seemingly similar phenomena in humans. We have noticed in rats a possibly related sequel to sudden meprobamate withdrawal.

We have been testing various substances for their counteraction of aminopterin toxicity in weanling rats. We were led to try meprobamate in this connection because patients receiving radiotherapy—or the "radiomimetic drugs" mustine (nitrogen mustard), tretamine (T.E.M.) or T.P.A.—are much less prostrated and do not suffer the usual anorexia if meprobamate is conjointly administered. Aminopterin and other non-competitive folacin-antagonists are "radiomimetic" agents.

When weanling female Sprague-Dawley rats are given aminopterin 0·3 mg. per kg. per day orally dissolved in milk, they fail to gain weight and usually stop eating completely by the 14th day; there are few if any survivors by the 21st day.[4] In three successive series of twelve rats each, where this aminopterin dosage was supplemented by meprobamate (200 mg. per kg. per day) (also orally dissolved in milk), the animals were in visibly better condition throughout the experiment; they ate well and gained weight, and there were eight, six, and eleven survivors severally at the 28th day.

Fortuitously, at the conclusion of the first series the survivors were not killed but returned to stock, and to the control diet (which in this instance was the regular allotment of homogenised milk and enriched white bread, minus both aminopterin and meprobamate). Usually, aminopterin-poisoned animals, if not moribund at the time of return to control diet, may recover after a return to the control diet; this has been done where genetic studies were contemplated. It was found, however, that those animals which had received meprobamate, and had continued well in the face of the concurrent aminopterin administration, invariably stopped eating within 24 hours of the withdrawal, and all were dead within 3 days. This happened in three successive series.

This observation recalls the clinical impression (which, unlike the observation on rats, is difficult to establish conclusively) that patients with neoplastic disease, who have been receiving meprobamate, but have it discontinued on admission to hospital for radiotherapy or radiomimetic drugs, have more acute side-effects than they would have had if they had not been given meprobamate at all. Since meprobamate has been found to be an effective palliative for the usual side-effects of radiation or radiomimetic therapy, we caution against its arbitrary or inadvertant withdrawal under these circumstances.

With increasing discussion of possible mutagenic and other baneful effects of radiation, and with the realisation that the various alkylating and cytotoxic agents now being exploited in cancer therapy must (at least theoretically) have the same potentialities as ionising radiation,

2. Baird, D. *In* Kerr, J. M. M., and others. Combined Textbook of Obstetrics and Gynæcology. Edinburgh, 1950; p. 462.
3. Swinyard, E. A., Hin, L., Fingl, E. *Science*, 1957, **125**, 739.
4. Barnard, R. D., Freeman, M. D. *Amer. J. dig. Dis.* 1955, **22**, 76.

the protective effects of meprobamate administration are of interest apart from any possible "withdrawal" effect. Of the nature of the protective mechanism we have no knowledge, but a hint is furnished by these withdrawal effects.

In barbiturate withdrawal, hyperexcitability and convulsions have been ascribed to the fall in plasma-cholinesterase produced by protracted barbiturate administration.[5] Radiation therapy produces a significant fall of blood-cholinesterase in humans [6] and of plasma and other determined cholinesterases in laboratory animals.[7 8] Bullock has shown nitrogen mustards and other alkylating agents to be effective denaturants of cholinesterase in vitro,[9] and we have seen this effect in vivo (unpublished data). Although we have seen no formal reports of the effect of meprobamate on blood and tissue cholinesterase systems, there are now attempts to relate "tranquilliser" activity to interaction with these systems, and it is therefore of considerable interest that Fraser [10] found that the closely related mephenesin potentiated plasma-cholinesterase activity in vitro, not only against a variety of substrates (as do many other compounds) but uniquely against its supposed physiological substrate, acetylcholine. The injection of plasma-cholinesterase affords some protection against aminopterin-poisoning in rats,[11] and meprobamate may act here through a potentiating or sparing effect on tissue cholinesterases.

If these hypotheses are correct, meprobamate-withdrawal hyperexcitability may have a similar explanation to that given earlier by Schütz [5] for barbiturate-withdrawal hyperexcitability, despite otherwise wide disparities in the pharmacodynamics of these two classes of drugs. In both instances there would have been a drop in transport cholinesterase from a previously higher level—that extant before administration in the case of barbiturates and that extant during administration in the case of meprobamate. That a relative or absolute drop in transport cholinesterase concentration can lead to hyperexcitability is evidenced by the tremulousness and anxiety of the acute leukæmic patient in relapse, in whose condition the blood-cholinesterase reaches a nadir. The mechanism of this remains to be elucidated.

Laurelton, Long Island, New York.

ROBERT D. BARNARD
JAMES F. BARNARD.

ANÆSTHESIA FOR CÆSAREAN SECTION

SIR,—May I be allowed to endorse the admirable plea by Mr. Savage and Dr. Hughes (June 22) for the abandonment of the slash-and-grab technique of cæsarean section.

The rationale of this method appears to be based on the assumption that, after thiopentone has been given to the mother, it is vital to extract the fœtus in the minimal possible time before the thiopentone has had time to depress the fœtal respiratory centre. This overlooks the fact that, in such an instance, thiopentone reaches the fœtus at the rate probably of the maternal circulation-time and thereafter starts to fall.[12] For obvious reasons the child cannot be delivered in under the maternal circulation-time: so, within reasonable limits, the longer the time interval between the injection of the drug and the extraction of the fœtus the lower will be the thiopentone level, and the greater will be the margin of safety in this respect.

In the absence of fœtal distress, undue speed is disadvantageous to all concerned: and I hope that this hoary old heresy will soon find its appropriate resting place in Limbo.

London, S.W.15. G. C. STEEL.

5. Schütz, F. *Quart. J. exp. Physiol.* 1944, **33**, 35.
6. Barnard, R. D. *Med. Rec.* 1948, **161**, 350.
7. Conard, R. A. *Amer. J. Physiol.* 1952, **170**, 418.
8. French, A. B., Wall, P. E. *Ibid*, 1957, **188**, 76.
9. Bullock, K. *Biochem. J.* 1956, **63**, 484.
10. Fraser, P. J. *Brit. J. Pharmacol.* 1956, **11**, 7.
11. Barnard, R. D., Freeman, M. D. *Amer. J. dig. Dis.* 1954, **21**, 163.
12. Crawford, J. S. *Brit. J. Anæsth.* 1956, **28**, 146.

MEDICAL STAFFS OF MENTAL HOSPITALS

SIR,—May another one-time student of Dr. Strauss voice the most acute disagreement, not to mention discomfort, with the suggestion put forward by Dr. Gurney Smith (May 18) that "promotion in the mental hospital service be made automatic."

This would be putting the clock back with a vengeance, at a time when every effort should be made to improve the quality and training of personnel working in mental hospitals. In any case promotion on seniority regardless of ability is an atrophying influence in any organisation.

Let us by all means induce people to enter the mental hospital service—but let us have them properly motivated.

Nebraska Psychiatric Institute, Omaha, Nebraska, U.S.A. FRANK WINSTON.

NEW WAYS WITH TAR OINTMENTS

SIR,—All preparations obtained from tar are exogenous carcinogens. The use of tar in dermatology is without doubt often successful, but the carcinogenic power of tar and its products should never be forgotten. We do nothing else therapeutically than simulate the skin experiment on mice, rats, and other animals. A revision of our therapeutic arsenal is an urgent necessity, for many carcinogens are applied in our prescriptions. The dyes and pharmaceutical vehicles in cosmetics need thorough investigation with regard to their carcinogenicity.

Düsseldorf. TH. OLBERT.

Public Health

Propaganda Against Smoking

IN his statement in the House of Commons last week (see p. 40) the parliamentary secretary to the Ministry of Health said that local health authorities would be asked, with the help of the councils for health education, to inform the public of the risks of smoking. A letter from the Ministry to local health authorities urges them to take steps to this end, under section 28 of the National Health Service Act, 1946. "What is wanted," says the letter, "is that the risks should be made known so that the individual who smokes can then make up his or her own mind."

The Central Health Services Council has drafted the following two texts for issue by local health authorities as posters:

SMOKING AND HEALTH

It is my duty to warn all cigarette smokers that there is now conclusive evidence that they are running a greater risk of contracting cancer than non-smokers. The risk mounts with the number of cigarettes smoked. Giving up smoking reduces the risk. . . . M.O.H.

TO ALL SMOKERS

There are now the strongest reasons to believe that smokers—particularly of cigarettes—run a greater risk of lung cancer than non-smokers. The more cigarettes smoked the greater the risk.

Copies of the Medical Research Council's statement on Tobacco Smoking and Lung Cancer, issued last week,[1] may now be obtained by the public (H.M. Stationery Office. 3*d*.).

Smallpox

A boy of 6 who was admitted to St. Ann's General Hospital, Tottenham, on June 23 was later transferred to the Joyce Green Isolation Hospital, Dartford, because of the possibility of smallpox. His grandmother was also ill and was admitted to the isolation hospital, but has since recovered. Smallpox has now been confirmed in the boy.[2] At St. Ann's Hospital, patients and staff have been vaccinated and admissions suspended.[3]

1. See *Lancet*, 1957, i, 1345.
2. *Manchester Guardian*, July 2.
3. *Times*, July 1.

Poliomyelitis

Uncorrected poliomyelitis notifications for the week ended June 22 were as follows (previous week in parentheses): paralytic 61 (41), non-paralytic 44 (42); total 105 (83). The total number of notifications this year up to and including the week ended June 22 is 1272, which is greater than any corresponding total in the preceding nine years (the previous highest was 1075 in 1950).

Mass Radiography: A Return Visit

The burghers of Bolton were surveyed by mass-radiography in 1948 and again at the end of 1955. The results of the two surveys are compared in the report for 1956 of the medical officer of health, Dr. R. W. Elliott. Some 27,000 people were examined in the first and 50,000 in the second survey; the prevalence of active tuberculosis found was 1·7 per 1000 in 1948 and 1·3 per 1000 in 1955. Of the 66 active cases, all but 2 were unsuspected; 15 had been radiographed in the past three years, and 33 had positive sputum. In 1948, the peak prevalence in men was in the 20–40 age-group; but in 1955 the prevalence rose with increasing age. The total prevalence decreased in men, but rose in women (from 1·3 to 1·7 per 1000), in whom the peak age was still 15–24. Most of the increase was in women employed outside their homes.

30 intrathoracic new growths were detected (excluding thyroid prolongations); of these, 19 were malignant tumours in men over 35 (in this group there were 18 cases of active tuberculosis). This represents a fourfold increase over the 1948 survey. On the other hand, there was a striking fall in the number of cardiac abnormalities found in the under-25 age-group (from 5·8 to 0·8 per 1000), attributed to the falling attack-rate of rheumatic fever. In the same group, the prevalence of bronchiectasis was 2·2 per 1000 in 1948 and 0·9 per 1000 in 1955.

The slight decline in the prevalence of active tuberculosis may not yet represent a decrease in the prevalence of the disease, for the number of cases on the register is static and the number of new cases increasing slightly. Moreover, the proportion of Mantoux-positive children aged 13 and 14 has fallen only slightly to about 30% and 40% respectively.

First Quarter in England and Wales

In the quarter ended March 31 the births registered in England and Wales exceeded deaths by 49,055—the highest natural increase for any March quarter since 1948. The main figures for this quarter have already been published.[1] The Registrar-General's quarterly return,[2] published this week, analyses the causes of death and gives other detailed information not included in the earlier return. A striking diagram illustrates how proportionate mortality in children aged 5–14 years has changed between 1911 and 1955. In 1911 22% of deaths in this age-group were due to tuberculosis, 23% to other infections, 9% to accidents, and 1% to cancer. The 1955 figures were: tuberculosis 2%, other infections 6%, accidents 32%, and cancer 15%.

A Career in Public Health

In an article on the Public-health Service as a Career, contributed to the educational number of the *Medical Officer* (June 28), Dr. H. D. Chalke, president-elect of the Society of Medical Officers of Health, refers to the growing integration of the public-health service with the hospitals and with general practice. Hospital doctors, says Dr. Chalke, are becoming more conscious of the social aspects of ill health; and the results of liaison with the public-health staff are encouraging, especially in conditions such as asthma and diabetes. Formerly some general practitioners were a little suspicious of the public-health department and antagonistic to health visitors; but opinion has changed greatly as the health visitors have worked more and more as members of the domiciliary team headed by the family doctor. The doctors in the health service, though divided artificially into three groups, are one body, each group complementing the others.

1. See *Lancet*, 1957, i, 925.
2. Registrar-General's Quarterly Return no. 433. H.M. Stationery Office. 1957. Pp. 32. 1s. 6d.

Obituary

GRAHAM PATTERSON McCULLAGH

V.R.D., M.A. Camb., M.D., B.Sc. Belf.

Dr. McCullagh, senior university lecturer in pathology and fellow and senior tutor of Queens' College, Cambridge, died on June 19 at the age of 52.

He was born and educated in Belfast where his father was a doctor. From Campbell College, where he held junior and senior scholarships, he entered, in 1922, the Queen's University. In 1927 he graduated M.B., and in 1929 B.SC., obtaining both degrees with honours. During the seven years after qualification, he held posts in Belfast as resident pathologist in the Royal Victoria Hospital, and later as a demonstrator and lecturer in the Institute of Pathology. During this time his published papers showed promise in original work. He also took his M.D. in 1931 and the D.P.H. the following year. In 1935, on his election to a university demonstratorship, he went, almost a stranger, to Cambridge, and within two years was offered a fellowship, and a year later a tutorship, at Queens' College.

His career in Cambridge was interrupted by the war. Since 1930 he had served as surgeon lieutenant and later as surgeon lieut.-commander in the R.N.V.R. In September, 1938, at the time of the Munich crisis, he was called up for the first time, and again in 1939, when he was attached to the R.N. hospital at Haslar. In addition to the routine duties of a specialist pathologist, he took an active share in a series of important experiments on underwater blast, under the direction of Surgeon Rear-Admiral C. P. G. Wakeley, the results of which were contained in a series of confidential reports submitted to the Director of Scientific Research and to the Medical Department of the Admiralty.

In 1941 he was promoted to be a surgeon commander and sent to continue active service oversea. On his way to Egypt, via the Cape, he contracted malaria. In Egypt he was stationed at Port Tewfik and was appointed as P.M.O. for the Suez Canal. After eleven months, and as a consequence of corneal ulceration, he was sent back to England to continue duty at the R.N. hospital, Seaforth, Liverpool. In 1945, as a result of further ill health he was demobilised with the rank of surgeon commander and the award of the V.R.D.

In 1945, after more than six years on active service in the Navy, he returned to Cambridge as senior lecturer in the department of pathology, in which he took an active share in the lectures and demonstrations given to undergraduates working for parts I and II of the natural-sciences tripos. He also undertook the arrangement of the time-table, together with the allocation of lectures and of demonstrations given by the teaching staff to undergraduates working for both parts of the tripos, to the content of both teachers and taught. For a number of years he examined in pathology in both parts of the tripos and also in the final M.B. examination.

His many activities restricted inevitably the time which he could give to original work, but he found time to continue his investigations of the effects of experimental interference with the carotid sinus and also of an increase of cholesterol in the diet and, in collaboration with Dr. Kendal Dixon, he studied the necrosis of liver produced by carbon tetrachloride. Moreover, he found not a little time to help and supervise the original work of his junior colleagues.

On his return to Cambridge he had at once become senior tutor of Queens' College, an appointment which

brought him into friendly and personal contact not only with the undergraduates and the fellows of Queens' College but with all members of the administrative staff. His ability and interest, his obvious enjoyment of every branch of college work, despite the serious disability caused by his war service, endeared him to his colleagues, his pupils, and the college servants, by all of whom he was regarded as a friend. As director of studies in medicine, he was interested particularly in his medical pupils, but he enjoyed also, to their great advantage, a close and personal intimacy with undergraduates reading subjects other than medicine. As a result of his interest in so many subjects, he became a member of college committees too numerous to mention. An example of his versatility was his work as financial tutor of the college.

His interests were confined neither to the department of pathology nor to Queens' College. In 1947 he was elected to the membership of the council of the senate—a post to which, during the last ten years, his reappointment has appeared to his friends as natural and inevitable. As a member of the council and, of course, of the faculty boards both of biology "B" and of medicine, he served the university with his customary efficiency and common sense on committees and syndicates.

H. R D., to whom we are indebted for this memoir, writes:

In all the important and varied work which he undertook Dr. McCullagh stood out as a man who got things done. Although he spoke but little, he had the happy knack of interesting other people and of enlisting their help and coöperation.

Dr. McCullagh was a good pathologist and, despite the encroachment of so many other subjects, he retained his interest in pathology both in original work and particularly in teaching, which he so much enjoyed. His personal charm, and a subtle sense of humour, endeared him to his friends who loved him, and by all those who knew him, and they were many, he will be remembered best as a loyal and devoted friend.

In 1938 Dr. McCullagh married Margaret Janet Dick, who survives him with two daughters and a son.

ISABELLA MARY MEARS

M.B. Edin.

Dr. Mears, who was for twenty-five years assistant medical superintendent of the Astley Ainslie Hospital, Edinburgh, died at Christchurch, New Zealand, on May 22.

Dr. Mears first trained as a teacher in physical culture at Dartford, but the medical tradition of her family was strong—both her parents were doctors—and she too decided to qualify in medicine. In 1921 she graduated M.B., and when the first unit of the Astley Ainslie Hospital was opened in 1923 she was appointed medical officer. The board of governors were anxious to promote a new concept of convalescence which would cover the care of the patient from the time his acute symptoms lessened until his full recovery. Dr. Mears's work at the Astley Ainslie during its early experimental years and as assistant medical superintendent in its later years of expansion gave her wide experience as a specialist in medical reablement. After she retired from the Astley Ainslie she joined the staff of the Davidson Clinic. Her last years were spent in New Zealand where she had already won new friends.

M. B. M. writes:

Dr. Mary Mears and I were fellow students in medicine, and although she had begun her studies at a later age than most of us, she endeared herself to us all and made many of us her firm friends for life. As she always thought the best of people, she had the faculty of drawing out the best in them and she never sat in judgment even on those with whom she disagreed.

To her the epithet "good physician" could be applied in the really wide sense. She was a fine clinician combining an unusual flair for diagnosis with a keen interest in the whole personality of the patient. This led her to make a special study of the psychological side of medicine and she brought help and healing to many who were suffering from nervous stress.

She had wide cultural interests outside her work and a keen artistic sense. This made her a delightful holiday companion and she had a genius for finding the most delectable and out-of-the-way spots from a dull looking map. She had a lively sense of humour, and behind a quiet and unassuming manner there was a zest for life and a youthfulness of spirit that made her friends wherever she went.

WILFRED JOHN PEARSON

D.S.O., M.C., D.M. Oxfd, F.R.C.P.

Dr. Wilfred Pearson, consulting physician to the Hospital for Sick Children, Great Ormond Street, and to University College Hospital, died on June 27 at the age of 73.

He came to U.C.H. from Oxford in 1909, and after qualifying was successively house-surgeon, house-physician, and R.M.O. In the first world war he had a distinguished career and was decorated twice. He was one of the few non-regular R.A.M.C. officers to achieve staff rank. On his return he took to pædiatrics and was elected to the staffs of Great Ormond Street and Charing Cross Hospitals. He left Charing Cross on his appointment as pædiatrician to his own old hospital. At U.C.H. he was the first physician to do only children's work, and the care with which the department was organised, incorporating as it does an infant-welfare centre, has been a joy to his successors. He was elected F.R.C.P. in 1928. From 1935 to 1943 he was vice-dean at U.C.H., but on the outbreak of the late war he became the hospital officer in charge of one of the Metropolitan sectors of the Emergency Medical Service. He resigned from the staff of U.C.H. in 1947 and shortly afterwards from his appointment as senior physician at Great Ormond Street. From then onwards he suffered continual ill health.

R. E. B.-C. writes:

Those of us who knew Wilfred Pearson well and worked for him before his illness remember with gratitude a wise and kind chief, who took pains to teach his juniors well. His game was golf at which he excelled, being at one time captain of the Cromer golf club, and here, too, he was an excellent teacher and managed to convey the rudiments to one inept pupil.

He married in 1909 Miss Charlotte Warrack. She survives him with two daughters.

LESLIE WILLIAM HEFFERMAN

M.D. Lond., F.R.C.S., F.R.C.S.E., D.Obst.

Dr. L. W. Hefferman, who was in practice for many years in Swansea, died on June 20 at the age of 62. He was educated at Epsom College and Middlesex Hospital, but in 1915, while still a student, he was given a commission in the 7th battalion of the Border Regiment. He was severely wounded in the Battle of the Somme in 1917. He returned to the Middlesex to complete his medical training. Soon after qualifying in 1920 he migrated to Burma and for some time held an appointment as surgeon in that country. He returned to Swansea in 1924, and once more took up his medical studies though he was engaged in a large general practice. In 1941 he took the D.OBST., and two years later the M.B. Lond., proceeding to the M.D. in 1945. In 1944 he obtained the fellowship of the English and Edinburgh Royal Colleges of Surgeons. The same year he was appointed honorary assistant surgeon to Swansea General Hospital. He was long a member of Swansea borough council.

J. B. writes:

Dr. Hefferman's municipal work is well known in Glamorganshire as is also the immense amount of energy which he displayed when president of the Medical Practitioners' Union from 1938 to 1948. By his death this organisation, of which he was latterly a member of council, has lost an able leader and a sound adviser. Dr. Hefferman was a true friend and colleague and there are many who will miss him. In the words of a Swansea citizen, "he was a grand doctor and an amazing man."

Notes and News

MAN-MIDWIVES

THE College of General Practitioners has just published its report [1] of an obstetric survey, with a historical introduction ranging from Soranus (A.D. 78–117) to local-authority antenatal care in the 1930s and the National Health Service; but "no authority," says the report, "has ever paid general practitioners to give a complete maternity service."

116 doctors supplied the information which forms the bulk of the report, by means of a questionary and an analysis card. Of the doctors, most were well established with big lists. Most had attended postgraduate courses, and a minority had held obstetric posts in hospital. Two-thirds held special antenatal sessions and three-quarters provided for instruction in the physiology of pregnancy and labour. A third attended all deliveries, and two-thirds all first deliveries, as a routine. All were prepared to do episiotomies, and most to undertake forceps and breech deliveries and manual removal of the placenta.

The survey includes 4277 births (9% of those in the area between June 1, 1954, and May 31, 1955). Of these, 1927 took place at home, and the rest in general-practitioner hospitals or nursing-homes. 63% of the mothers had seven or more antenatal consultations, and the doctor attended delivery in 48%. The commonest antenatal abnormality was hypertension (16% of primiparæ, 9% of multiparæ), and the second commonest abnormal presentation (4%). The overall perinatal mortality was 33·9 per 1000 births, compared with an average of 39 for the area. The perinatal mortality-rate of the 61 premature babies in the series was 217 per 1000; the rate for babies of more than 5½ lb. (or of unknown weight) was 21·1 per 1000. Many of the babies lost in home delivery were born so quickly that the mother could not have been moved to hospital.

The forceps-rate was 5% (2% in multiparæ, 12% in primiparæ, and 26% in primiparæ aged over 30). Half the forceps deliveries were unpredictable up to the end of the first stage of labour. Prophylactic ergometrine was little used, and after forceps the post-partum-hæmorrhage rate was high. The anæsthetic most commonly used was chloroform. The version-rate varied with the number of antenatal examinations; the breech-delivery rate did not, but was low (total 88). The survey includes one set of quadruplets and 61 of twins. The quadruplets were lost, and 17 of the twins—two-thirds of them among the third born prematurely. Primiparæ delivered at home did well (excluding those with hypertension, or multiple, premature, or breech deliveries), but there was a high fœtal loss when high-parity (5 or more) mothers were delivered at home.

Where the general practitioner had arranged in advance to attend the confinement, there was a higher proportion of episiotomies and forceps deliveries than when the midwife was in charge. In confinements of primiparæ, perinatal mortality-rates were lower for normal, forceps, breech, and twin deliveries when the doctor had previously arranged to attend; for multiparæ, these rates were higher in spontaneous and forceps deliveries and lower in breech and twin deliveries. There was neonatal asphyxia in 1·4% of deliveries where no analgesia was used; the only analgesic followed by a higher asphyxia-rate than this was pethidine plus gas-and-air, but the perinatal mortality after this combination was lower than that after gas-and-air alone.

PROGRESS AT COONOOR

To celebrate fifty years of service by the Pasteur Institute of Southern India at Coonoor, a Golden Jubilee Souvenir has been issued. The foreword by Dr. N. Veeraraghavan, the director, describes the souvenir as a "humble tribute to the distinguished men who have guided its destinies and to the workers to whose unremitting endeavours it owes its scientific position in the world today."

The preparation of rabies vaccine was a chief reason for the institute's foundation, and has always been an outstanding feature of its work; more recently research on other viruses has been done, and the first isolation in India of influenza virus was at the institute. New virus laboratories have been opened, with special devices for sterilising the exhaust air. Many other diseases common in the tropics have been investigated: diarrhœa due to fusospirochætosis, heparin in the treatment of viper bite, and the serology of tropical eosinophilia are a random few of the many topics mentioned.

1. An Obstetric Survey by Members and Associates of the South-west England Faculty of the College of General Practitioners. 1957. Published by the college, 14, Black Friars Lane, London, E.C.4. Pp. 90. 6s.

AN INSTITUTE OF CRIMINOLOGY?

IN a letter to the Home Secretary, the Howard League has suggested that the establishment of an Institute of Criminology should be considered. Most Continental countries have one or more such institutes, and even small universities have chairs in criminology; and some qualification in this subject is often essential for holders of judicial offices. In this country, on the other hand, there is not a single chair of criminology, teaching of this subject is not properly coördinated, and there is no separate qualification in it. The proposed institute, the Howard League suggests, should concentrate in the first instance on postgraduate work; and if it set a high standard the possession of a qualification in criminology might become desirable to some of those concerned with the administration of justice, the treatment of offenders, and the prevention of crime. At the other end of the scale, non-diploma courses are already proving valuable, not least as a common meeting-ground for discussion of problems to which there may be widely differing approaches; and the proposed institute might encourage this development. The institute, the letter concludes, might best be located in London; and the staff should include representatives of the various disciplines concerned, such as sociology, social psychology, law, and perhaps forensic psychiatry.

University of Cambridge

A gift of £3500 has been made to the university for use by the department of pathology. The gift, which represents voluntary contributions by American Servicemen of all branches in the United Kingdom, was made on the recommendation of the medical staff and patients of the 7510 United States Air Force Hospital, Wimpole Park, in memory of Sir Lionel Whitby to mark appreciation of the help which had been received from the department.

University of Bristol

At recent examinations the following were successful:

M.D.—F. G. Bolton, Nedjdet Gurgen Sanerkin, L. A. D. Tovey.

M.B., Ch.B.—Janette A. Hockin, S. C. J. Shortman (second-class honours); F. I. Akinsete, T. J. Betteridge, Pauline M. Bland, D. E. Bowden, C. C. L. Brewer, W. L. Burland, G. F. Counsell, S. M. Daniels, Norma St. C. Dansie, H. G. K. Douglas, Bethia M. Dowell, J. M. English, Sheila A. Faint, C. G. Falkner, Derek Faulkner, I. D. Fraser, Joyce Fung, D. M. Innes, C. W. Jenkins, Audrey King, J. O. Koney, G. W. Manley, Jean Moffatt, Alan Morgan, Humphrey Onwuegbusi Nwa Onubogu, D. C. Pengelly, K. T. Rackham, D. A. S. Robertson, A. L. Rose, J. F. Shaw, M. E. Sheard, P. R. Stock, G. B. Sutton, Margaret Taylor, Ivan Thompson, D. C. Weeks, H. G. Wotherspoon (pass); G. T. Curtis, H. E. Millen, R. W. Prescot, J. R. Stamper, D. W. Zutshi (in group I, completing the examination).

University of St. Andrews

On June 27 the following degrees were conferred:

M.D.—D. A, R. Simmons (with honours and a university gold medal), George Smith (with honours and a Rutherford gold medal), I. M. Baird (with honours and a Rutherford silver medal), H. D. Attwood (with commendation), A. T. Sandison (with commendation), J. S. Garrow, Elizabeth G. W. Barker or Gore, D. A. McGreal, George Williams, J. S. Young.

M.B., Ch.B.—I. M. Breckenridge, Heather M. Mitchell (with honours); I. A. Harper, Sheila M. Russell, Margaret R. Mellor, Isabel L. Wilson (with commendation); Gerrit J. Alberts, Letitia R. Arnett, D. M. Bearpark, R. S. Bluglass, W. R. Boraston, A. J. Chalmers, E. M. Clark, R. V. Clark, Mollie D. Cratchley, J. R. N. Curt, H. W. R. Davidson, R. C. Deacon, A. K. Dewar, A. G. Dunlop, H. O. Fadahunsi, Josephine S. Foils, Sheila B. Forbes, A. R. Gale, D. P. High, Iain Huddleston, Geoffrey Illingworth, Christine M. L. Kerr, Max Kostyn, Ruth Lewty, D. E. Lyons, J. L. McIntyre, Jessie C. M. MacRae, Patricia A. R. Miller, Robina W. Moar, Judith F. E. Moody, Lewis Mullins, P. E. North, D. L. T. Parsons, R. L. Payne, J. M. Penman, D. A. Pitkeathly, David Pope, G. B. Rae, W. E. Rees, William Russell, H. J. C. Scrimgeour, G. M. E. Sewell, Michael Sheridan, Brian Smith, B. D. Smith, G. O. Sofoluwe, H. W. Sutherland, Patricia A. Thomas, Nesta M. H. Tullis, Ann F. Tuxford, F. L. M. Waiyaki, C. M. Wiseman, Annie M. Wolff.

Royal College of Physicians of Ireland

On June 24 Dr. Paul Dudley White received the honorary fellowship of the college, and gave an address on hypertension and coronary thrombosis.

London Council of Social Service

At the annual general meeting, to be held at the Mansion House on Tuesday, July 9, at 3.15 P.M., Dr. Neville Goodman will speak on the Health Service and Voluntary Service in London.

Royal Medical Benevolent Fund

The annual general meeting of this Fund is to be held on Wednesday, July 31, at 5 P.M., at 11, Chandos Street, London, W.1.

International Congress of Orthopædic Surgery and Traumatology

This congress will be held in Barcelona from Sept. 16 to 21. Further particulars may be had from Dr. José M. Vilardell, Avda José Antonio 654, Barcelona, Spain.

Polar Medal

A clasp to the Polar Medal has been awarded to Surgeon Lieut.-Commander D. G. Dalgliesh, R.N., leader and medical officer of the advance party of the Royal Society Antarctic Expedition for the International Geophysical Year.

Institute of Diseases of the Chest

Clinical demonstrations, open to doctors without fee, will be continued at this Institute (in the grounds of the Brompton Hospital, Fulham Road, S.W.3) on Fridays at 5 P.M. throughout the summer.

Asian Pædiatric Congress

The first Asian Regional Pædiatric Congress will be held in Singapore from May 26 to 30, 1958. The regions invited are the Indian subcontinent, the Far East, South-east Asia, and Australasia. Further information may be had from the organising secretary, Pædiatric Unit, General Hospital, Singapore 3.

British Medical Association

The council of this association will consider in 1958 an award of the Middlemore prize (£50) for the best essay on local antibiotic treatment in external ocular disease, and an award of the Nathaniel Bishop Harman prize (£100) for the best report on original clinical research. Further particulars may be had from the secretary of the association, B.M.A. House, Tavistock Square, London, W.C.1.

New Town Hospital

A site was reserved for a hospital in the plans for Harlow new town and it is now expected that site works will be started before March, 1958, and building before December of that year. The hospital is to be built in four stages and the first stage will include the outpatient, radiology, and casualty departments. It is designed to provide consultative services for patients referred by general practitioners and a treatment unit to which serious emergency and accident cases can be admitted. The cost of the whole hospital, which will have 244 beds, is estimated at £2 million.

Royal Institute of Public Health and Hygiene

The report for 1956, presented at the annual meeting on June 13, shows that 61 postgraduates enrolled during the year for teaching in public and industrial health, and that the percentage of passes for the Conjoint Board's diploma in public health was over 90. Applications for the institute's certificates (for purity, quality, or merit of foods and other articles, or appliances) numbered 36, and the certificated articles are on view in the museum of hygiene at 26, Portland Place, London, W.1, open to the public daily. In the chemical and bacteriological laboratories at 23, Queen Square, W.C.1, over 2300 samples were examined. The president is Mr. Walter Elliot, F.R.C.P., F.R.S., the chairman of the executive committee Mr. J. C. Ainsworth-Davis, F.R.C.S., and the acting dean and director of laboratories Dr. J. Browning Alexander.

Travelling Fellowships for General Practitioners

Applications are invited from members of the College of General Practitioners, resident in the United Kingdom, for fifteen travelling fellowships of £200 each, for not less than two weeks' postgraduate study at their old teaching hospitals or at any other hospitals, clinics, or health centres of their choice in the British Isles.

These fifteen Upjohn travelling fellowships are to be presented annually by Messrs. Upjohn of England, Ltd., to members of the college in the following proportions: England, 10; Scotland, 3; Wales, 1; Northern Ireland, 1. They must not overlap with Ministry of Health grants for postgraduate study. Applications for the 1957 fellowships, with a brief account of the postgraduate work to be undertaken, should be sent to the chairman of the postgraduate education committee of council, College of General Practitioners, 54, Sloane Street, London, S.W.1, before Sept. 1. The names of successful applicants will be announced at the annual general meeting of the college on Nov. 16.

Universities Federation for Animal Welfare

The federation is holding a summer school at Westham House, Barford, Warwick, from Sept. 14 to 21. Further particulars may be had from Miss M. P. Williams, 7a, Lamb's Conduit Passage, London, W.C.1.

Diary of the Week

JULY 7 TO 13

Tuesday, 9th

CIBA FOUNDATION
5 P.M. (Zoological Society, Regent's Park, N.W.1) Dr. N. W. Shock (Baltimore): Age Changes in Physiological Functions in the Total Animal.

SOCIETY FOR THE STUDY OF ADDICTION
8 P.M. (11, Chandos Street, W.1) Dr. E. Lincoln Williams, Dr. A. A. Macdougal, Dr. M. M. Glatt: Group Therapy in Alcoholism.

Wednesday, 10th

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. A. K. Saha (India): Zero-position of Glenohumeral Joint—Its Recognition and Clinical Importance.

ROYAL COLLEGE OF SURGEONS OF EDINBURGH
3 P.M. Sir Charles Read, F.R.C.O.G.: Reflections on Pelvic Exenteration.

Thursday, 11th

GUY'S HOSPITAL MEDICAL SCHOOL, London Bridge, S.E.1
5 P.M. Mr. A. S. Parkes, SC.D., F.R.S.: Art of Discovery. (Addison lecture.)

INSTITUTE OF NEUROLOGY, National Hospital, Queen Square, W.C.1
5.30 P.M. Prof. H. Houston Merritt (New York): Pathophysiology of Convulsive Seizures.

Appointments

ABEL, W. J., M.B. Edin., M.R.C.P.E., D.P.M.: consultant psychiatrist, Hellesdon Hospital, Norwich.

DAVIES, MARGARET E. B., M.B. Wales: assistant psychiatrist (S.H.M.O.), Hensol Castle Mental Deficiency Institution, Pontyclun, Glamorganshire.

EDGAR, WILLIAM, M.B. Edin., D.P.H., D.C.H.: deputy M.O. and deputy principal school M.O., Bradford.

JOHNSTONE, A. F., M.B. Aberd., D.P.M.: consultant psychiatrist, Craig Dunain Hospital, Inverness.

JONES, K. S., M.B. Lond., D.P.M.: consultant psychiatrist, Morgannwg Hospital, Bridgend.

LOFTUS, ANTHONY, L.R.C.P.I.: M.O.H., Skegness, Alford, and Spilsby.

ROBERTS, D. P. W., M.B. Birm., D.OBST.: assistant M.O.H. and school M.O., Chester.

Birmingham Regional Hospital Board:

AUSTIN, R. J., M.B., D.P.H.: assistant chest physician, Birmingham (sanatoria) group of hospitals.

BACKHOUSE, T. W., M.B. Camb., F.F.R. R.C.S., D.M.R.T.: consultant radiotherapist, Coventry group of hospitals.

KUBIK, M. M., M.D. Prague, M.R.C.P.E.: consultant physician and medical superintendent, Burton Road Hospital, Dudley.

STEPHENSON, A. G., M.B. Lond., M.R.C.P.: assistant gerontologist, South Warwickshire group of hospitals.

STIRRAT, JEANNIE E., M.B. Birm., D.P.M.: part-time consultant child psychiatrist, Birmingham child-psychiatry clinics.

Manchester Regional Hospital Board:

COWEN, JACK, M.B. Edin., D.M.R.D.: consultant radiologist, North Manchester, Booth Hall, and Monsall groups of hospitals.

LECH-LACHOWICZ, Z. S., MED. DIP. Lwow, D.M.R.D.: consultant radiologist, South Manchester group of hospitals.

MCCORRY, R. L., M.B. Belf., M.R.C.P.I.: assistant pathologist, Preston and Chorley Hospitals.

Colonial Appointments:

BAKER, W. DE C., M.B. Manc.: M.O., Kenya.

BIRCH, N. H., M.B. Leeds, F.R.C.S.: M.O. (special grade), Tanganyika.

BURN, KATHLEEN, M.B. Manc.: M.O., Northern Nigeria.

DENNIS, JOHN, M.B. Lond.: M.O., Kenya.

FOSTER, R. M., M.B. Edin., M.R.C.P.E.: M.O. (special grade), Kenya.

HUNTER, JOHN, M.B. Edin: M.O., Kenya.

LAL, KUNDAN, M.B. Punjab, D.M.R.T., D.M.R.D.: radiologist (therapy), Singapore.

MCCORMICK, R. G., M.B. Brist.: house-physician, St. Vincent, Windward Islands.

PANG, T. C., M.B., D.OBST.: senior forensic pathologist, Hong-Kong.

PITT, C. S., M.R.C.S., D.T.M. & H., D.P.H.: senior M.O. (clinical), Kenya.

RASSIM, H. S., M.R.C.S., D.M.R.E.: radiological specialist, Hong-Kong.

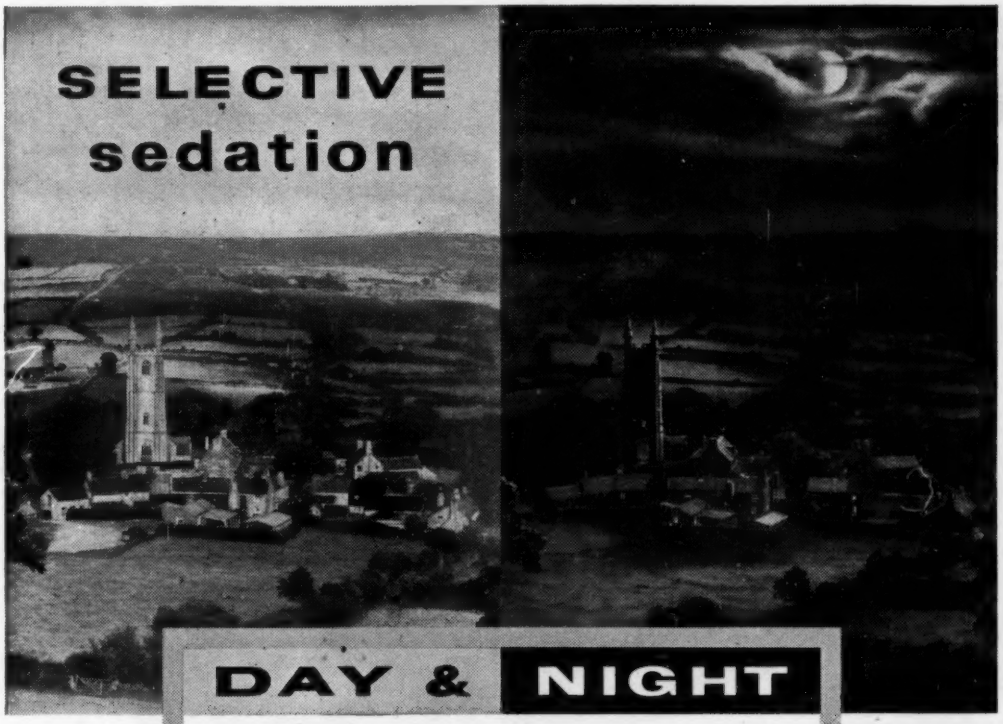
REIDY, JEREMIAH, M.B. N.U.I., D.P.H., D.C.H.: senior M.O. (administrative), Kenya.

STEWART, ELIZABETH, M.B. Glasg., D.OBST., D.P.H.: M.O. (grade B), Trinidad.

STRACEY, N. P. ST. C., M.B. Calcutta, F.R.C.S.E.: senior surgeon, British Guiana.

WILLIAMS, F. M. W., M.B. Lond., M.R.C.P.E.: senior physician, Public Hospital, Georgetown, British Guiana.

WOOLNER, H. W., L.R.C.P.E., D.P.H.: senior health officer, Western Region, Nigeria.



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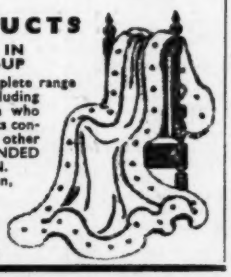

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Leeds R.H.B. Locum Cons. or Sr. H.M.O. & Sr. H.M.O. 33
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Taunton & Somerset. H.O. 46
Tredegar Gen. H.O.'s 45
Tunbridge Wells. Kent & Sussex. Pre-reg. H.O. 45
Welsh R.H.B. Regs. 46
West Bromwich & Dist. Gen. Pre-reg. H.O. 46
Wigan & Leigh H.M.C. Sr. H.O. & Pre-reg. H.O.'s 46
Workington Infy. Pre-reg. H.O. or Sr. H.O. 46
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The Terms and Conditions of Service of Hospital Medical and Dental Staff apply to all N.H.S. hospital posts we advertise, unless otherwise stated. Canvassing disqualifies, but candidates may normally visit the hospital by appointment.

Academic and Educational

THE UNIVERSITY and the ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW

POSTGRADUATE MEDICAL EDUCATION COMMITTEE

PRIMARY EXAMINATION FOR THE SURGICAL FELLOWSHIPS OR FOR THE F.F.A.R.C.S.

A COURSE OF INSTRUCTION in Anatomy, Physiology, Biochemistry, Pathology and Bacteriology suitable for candidates preparing for the Primary Examination of the Fellowship *qua* Surgeon of the Royal Faculty of Physicians and Surgeons of Glasgow will be held from 7TH OCTOBER to 6TH DECEMBER, 1957. (The Primary Examination conducted by the Glasgow Royal Faculty is accepted by the Royal Colleges of Surgeons of Edinburgh, of England, and in Ireland in lieu of the corresponding examinations of these Bodies.)

The Course will comprise a total of approximately 180 hours instruction given daily from MONDAYS to FRIDAYS, between the hours of 12 NOON and 5.30 P.M.

The Course will be open to junior staff of hospitals in the Western Region of Scotland and also to other suitable applicants. Applicants not employed in the hospitals of the Western Region may, if they wish, be given an honorary clinical attachment to 1 of the surgical teaching units.

The fee for the Course is £30.

A modified form of the Course is available for trainees in anæsthetics. This modified Course will provide 9 weekly sessions on the Pharmacology of the Anæsthetic Drugs in place of the sessions on Embryology in the surgical Course.

Trainees in anæsthetics who are unable to take the complete Course may enrol for the Pharmacology Course alone at a fee of £6.

For further details and syllabus of the Course, application should be made to the Director of Postgraduate Medical Education, The University, Glasgow, W.2.

COURSE IN MENTAL DEFICIENCY

A short intensive postgraduate Course in Mental Deficiency will be held from 7TH OCTOBER to 25TH OCTOBER, 1957.

The Course will comprise :—

(*a*) Lectures and demonstrations in various aspects of mental handicap and mental deficiency.

(*b*) Instruction in mental testing.

(*c*) Visits to institutions.

Fee: £18.

The Course will be limited to 20 practitioners, places being allocated in order of return of application forms, which may be obtained from the Director of Postgraduate Medical Education, The University, Glasgow, W.2.

SIR ALFRED FRIPP MEMORIAL FELLOWSHIP

Applications are invited for the Sir Alfred Fripp Memorial Fellowship in Child Psychology tenable at Guy's Hospital. The Fellowship is open to medically qualified Men or Women under the age of 35, preferably with experience in pædiatrics as well as in psychological medicine. Stipend £250 p.a. The appointment is for 2 years and may be held concurrently with a part-time appointment at Guy's or elsewhere.

Applications should be forwarded to the Dean, Guy's Hospital Medical School, S.E.1 (from whom copies of the regulations may be obtained), together with the names of 3 referees, not later than 15th July, 1957. Candidates should submit with their applications particulars of their previous career and a definite scheme of advanced study or research to be carried out during the tenure of the Fellowship.

CHRISTIAN MEDICAL FELLOWSHIP

ANNUAL BREAKFAST, TUESDAY, 16TH JULY, 1957, at 8.15 A.M., The Banqueting Hall, Royal Station Hotel, Newcastle upon Tyne. (During B.M.A. Meeting). Chairman : WELDON WATTS, M.S., F.R.C.S.ED. (President-Elect of the B.M.A.).

Speaker : ROBERT G. COCHRANE, M.D., F.R.C.P., D.T.M. & H.

Subject : "Changing Standards in Medical Practice."

Those intending to be present are asked to notify Dr. W. CONDIE, Pierremont, 36, Sunderland-road, Heworth, Gateshead, 10 (Tel. Felling 82619).

MENTAL HEALTH RESEARCH FUND

STUDENT PRIZES AND TRAVELLING FELLOWSHIP IN PSYCHIATRY

The Mental Health Research Fund awards annually to Medical Students and Doctors in their pre-registration year 3 Monetary Prizes and a Travelling Fellowship as the result of an essay competition on a subject relating to mental health, and a subsequent interview.

Applicants gaining the top 3 places in the essay competition will be given prizes of £100, £50, and £25 respectively.

The Travelling Fellowship, tenable in a Psychiatric or other Department abroad for up to 6 months, will be awarded as the result of an interview combined with consideration of the candidate's undergraduate record. Persons interviewed will be chosen from the top 10 in the essay competition. The Travelling Fellowship will normally be taken up at the end of the pre-registration year or, in the event of it being awarded to a medical student, may be taken up after qualification.

The subject for the essay this year is "The Relative Importance of Nature and Nurture in the Development of Psychiatric Disorder."

The Panel of Examiners consists of 2 members of the Research Committee of the Mental Health Research Fund and 1 member of the Association of Teachers of Psychiatry in Undergraduate Medical Schools.

Essays should be sent, before 1st March, 1958, to the Secretary, Research Committee, Mental Health Research Fund, 39, Queen Anne-street, London, W.1 (Tel. : WELbeck 1272), from whom further details may be obtained.

THE MILROY LECTURES ON STATE MEDICINE AND PUBLIC HEALTH

The Council of the Royal College of Physicians of London are prepared to receive applications for the office of MILROY LECTURER for 1959.

Applications must be addressed to the Registrar, Royal College of Physicians, Pall Mall East, S.W.1, to reach the College on or before WEDNESDAY, 11TH SEPTEMBER, 1957, and to include a short synopsis of the subject selected by the candidate.

2 Lectures are to be given on a TUESDAY and THURSDAY in FEBRUARY, or MARCH, 1959.

A copy of Dr. Milroy's "Suggestions" on the subject of his bequest, and information as to the emolument, may be obtained from the Registrar.

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL (UNIVERSITY OF LONDON), London, S.W.1. Applications are invited for the post of LECTURER IN BACTERIOLOGY. Salary scale £1150–£1750, with additional children's allowances and F.S.S.U. benefits. Applicants should hold a medical qualification and have had a general training in the field of pathology and/or bacteriology.

Applications, with the names of 2 referees, should reach the Secretary by 31st August, 1957.

DALHOUSIE UNIVERSITY. Applications are requested to fill 1 vacancy at the Department of Bacteriology, Dalhousie University, with the rank of either ASSISTANT or ASSOCIATE PROFESSOR according to qualifications. A good salary is offered.

Applicants should hold either a Ph.D. or a medical degree. Duties will consist of the teaching of bacteriology to medical, dental science and University undergraduate students. Opportunities exist for hospital clinical bacteriology and field studies in epidemiology.

Plans are now being completed for enlargement of the existing laboratory building which will more than double the present space.

Applicants are requested to state their experience and salary expected. Duties to commence 18th September, 1957.

University superannuation, group life, and hospitalisation insurance benefits are available.

Applications should be forwarded to Prof. C. E. VAN ROOYEN, M.D., Department of Bacteriology, Dalhousie University, 62, University-avenue, Halifax, N.S. Canada.

UNIVERSITY OF CAPE TOWN/PROVINCIAL ADMINISTRATION OF THE CAPE OF GOOD HOPE. Joint Medical Staff. Applications are invited for the CHAIR OF CHEMICAL PATHOLOGY in the University of Cape Town. The appointment will be made under the terms of the Joint Staff agreement between the University of Cape Town and the Provincial Administration of the Cape of Good Hope. It is a full-time appointment and the occupant of the Chair is not permitted to undertake remunerative private work. The salary is £2688 p.a., plus a temporary cost-of-living allowance for a married man (at present £234 p.a.).

Applications should state age, experience, qualifications, publications, and research interests, and should give the names of 2 referees. 2 copies of the application and testimonials should reach the Secretary, Association of Universities of the British Commonwealth, 36, Gordon-square, London, W.C.1 (from whom memoranda giving the general conditions of appointment and further information about the work of the department of Chemical Pathology should be obtained), not later than 15th August, 1957. An additional copy should be sent direct by air-mail to the Registrar, University of Cape Town, Private Bag, Rondebosch, Cape Town, South Africa, by the same date.

The University reserves the right to appoint a person other than one of the applicants or to make no appointment.

Hospital Services : Senior Appointments

HAMMERSMITH HOSPITAL AND POSTGRADUATE MEDICAL SCHOOL, Ducane-road, London, W.12. Applications are invited for the post of Whole-time CONSULTANT RADIOTHERAPIST. The successful candidate will be responsible for isotope therapy ; considerable experience in this field is essential.

Applications, stating age and giving full details of qualifications and experience, together with names of 3 referees, should reach the Secretary, Board of Governors, The Hammersmith, West London and St. Mark's Hospitals, Ducane-road, London, W.12, by 10th August.

ST. MARY'S HOSPITAL, Paddington, W.2. Applications are invited for the appointment of a Locum ASSISTANT RADIOTHERAPIST (Senior Hospital Medical Officer), for a period of 4 months, with effect from 1st August, 1957. Candidates are expected to hold the Diploma in Radiology and the successful candidate will be required to undertake a minimum of 5 notional half-days per week.

Applications, stating nationality, date of birth, permanent address, qualifications with dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, not later than 16th July, 1957.

ST. MARY'S HOSPITAL, W.2, AND THE NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post of Part-time CONSULTANT OPHTHALMIC SURGEON. 4 sessions per week at the Western Ophthalmic Hospital, where the main ophthalmic work of the Teaching Group is undertaken, and 1 outpatient session per week at Paddington General Hospital.

Applications (16 copies), stating nationality, date of birth, permanent address, qualifications with dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should be sent not later than 16th August, 1957, to the House Governor, St. Mary's Hospital, London, W.2, from whom further information may be obtained.

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD.

(1) CHILD PSYCHIATRIST (7 half-days a week), Senior Hospital Medical Officer grade, Willesden Child Guidance Centre, 22, Brondesbury-villas, Kilburn, N.W.6. Centre may be visited by direct appointment. (Tel. : MAIda Vale 0621).

Applications before 6th August, 1957.

(2) CONSULTANT SURGEON (3 half-days a week), Royal Northern Hospital, Holloway-road, N.7 (279 Beds).

Applications before 12th August, 1957.

(3) ASSISTANT PATHOLOGIST (whole-time), Senior Hospital Medical Officer grade, King Edward Memorial Hospital, Ealing, W.13, and associated hospitals. Duties include Public Health Laboratory work and general practitioner service for surrounding area.

Applications before 15th August, 1957.

Hospitals may be visited by direct appointment.

Application forms obtainable from, and returnable to, Secretary, North West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1.

ROYAL NATIONAL ORTHOPÆDIC HOSPITAL, 234, Great Portland-street, London, W.1. Applications are invited for the appointment of CONSULTANT PHYSICIAN in Physical Medicine (part-time). 5 or 6 sessions a week.

Applications (1 copy), stating age, qualification and details of experience, and the names of 3 referees, to be addressed to the House Governor by 13th August, 1957.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for a superannuable post of ASSISTANT SENIOR MEDICAL OFFICER at a salary of £1730–£80(4)–£100(1)–£2150, inclusive of London weighting. The successful applicant will be required to undertake duties under the direction of the Senior Administrative Medical Officer. Experience in general medical administration is essential.

Applications, giving particulars of qualifications and experience, together with the names of 3 referees, should reach the Senior Administrative Medical Officer, South East Metropolitan Regional Hospital Board, 11, Portland-place, London, W.1, by 20th July. Envelopes should be marked "A.S.M.O."

CARDIFF. THE UNITED CARDIFF HOSPITALS. Applications are invited for the appointment of SENIOR CASUALTY OFFICER at the Cardiff Royal Infirmary. Non-resident appointment, to commence August/September, for a period of up to 4 years. Salary on the scale £1653 15s.–£52 10s.–£1811 5s. in the fourth year.

Application forms are available from the Secretary to the Board, at the Cardiff Royal Infirmary, Newport-road, Cardiff, and should be returned within 14 days of the appearance of this advertisement.

HASTINGS GROUP HOSPITAL MANAGEMENT COMMITTEE. Locum CONSULTANT ANÆSTHETIST required from 9th to 19th July, inclusive. Post non-resident. Remuneration £5 10s. 3d. per notional half-day for 9 sessions per week.

Apply immediately, with details of qualifications and experience, to Group Secretary, Hastings Group Hospital Management Committee, 11, Holmesdale-gardens, Hastings (Tel. Hastings 5400).

REVISED ADVERTISEMENT

LEEDS REGIONAL HOSPITAL BOARD. Whole-time ASSISTANT PSYCHIATRIST (Senior Hospital Medical Officer scale) for duties at Clifton Hospital, York (1112 Beds), and associated clinics at Harrogate, York, and Scarborough. The person appointed may also have duties at Claypenny Hospital for Mental Defectives (1 session per week). Detached 4 bedroomed house available.

Applications (12 copies), stating age, qualifications, and details of present and previous appointments with dates, and names and addresses of 3 referees, to the Secretary, Park-parade, Harrogate, by 9th August. 1957.

LEEDS REGIONAL HOSPITAL BOARD. Whole-time Locum CONSULTANT or SENIOR HOSPITAL MEDICAL OFFICER in Psychiatry, required immediately for 2–3 months at Broadgate Hospital, Beverley.

Applications, stating age, qualifications and details of appointments held with dates, together with the names and addresses of 3 referees, to the Secretary, Park-parade, Harrogate, as soon as possible.

LEEDS REGIONAL HOSPITAL BOARD. Whole-time or maximum Part-time CONSULTANT GERIATRICIAN, Halifax Group of hospitals (466 Beds). The successful candidate will be in clinical charge of the Geriatric Service in the area and will be required to reside in Halifax.

Applications (12 copies), stating age, qualifications and details of appointments held showing dates, with names and addresses of 3 referees, to the Secretary, Park-parade, Harrogate, by 9th August, 1957.

LEEDS REGIONAL HOSPITAL BOARD. Locum Tenens CONSULTANT in Pædiatrics (8 notional half-days per week) at Dewsbury from mid-August to mid-October, 1957.

Applications, stating age, qualifications and details of appointments held with dates, together with names and addresses of 3 referees, to the Secretary, Park-parade, Harrogate, as soon as possible.

LEEDS REGIONAL HOSPITAL BOARD. Applications are invited from medical practitioners for the appointment of ASSISTANT SENIOR MEDICAL OFFICER on the staff of the Senior Administrative Medical Officer at the Board Headquarters, Harrogate, at a salary of £1680–£80 (4)–£100 (1)–£2100 p.a. The officer concerned will be required to assist generally the Senior Administrative Medical Officer and particularly with the administration of the Board's Mental Health Services, for which expert psychiatric advice will be available. Previous experience of medical administration and a knowledge of mental health work will be considered an advantage.

Applications, with full details of qualifications and experience, together with the names of 3 referees, to be sent to the Secretary, Park-parade, Harrogate, by 18th July, 1957.

MANCHESTER REGIONAL HOSPITAL BOARD. Whole-time or maximum Part-time ASSISTANT PSYCHIATRIST (Senior Hospital Medical Officer) to the North Manchester Group of hospitals, mainly at Crumpsall Hospital (1200 Beds). Good experience essential, D.P.M. desirable.

Application forms from the Senior Administrative Medical Officer to the Board, Cheetwood-road, Manchester, 8, to be returned by 22nd July, 1957.

MANCHESTER REGIONAL HOSPITAL BOARD.

(*a*) Whole-time or maximum Part-time CONSULTANT PSYCHIATRIST AND MEDICAL SUPERINTENDENT to Lancaster Moor Hospital, Lancaster (2500 Beds), resident or, if non-resident, appointee to live close to hospital. All forms of modern therapy are undertaken and there are outpatient clinics at the Royal Lancaster Infirmary and Queen Victoria Hospital, Morecambe. Wide experience and possession of higher qualifications essential. 22nd July, 1957.

(*b*) Whole-time Additional CONSULTANT PATHOLOGIST to the Oldham and District Hospitals Group Laboratory at Oldham and District General Hospital. Special interest in bacteriology and biochemistry desirable. Wide experience in hospital pathology essential and higher qualifications desirable. Appointee to live near main hospital. 23rd July, 1957.

(*c*) Additional Whole-time CONSULTANT RADIOLOGIST, tenable mainly at Crumpsall (1200 Beds), Booth Hall (Children's, 380 Beds), and Monsall Hospitals, Manchester, but possibly with duties at other hospitals in the North Manchester Group and Prestwich (Mental) Hospital. Wide experience, higher qualifications essential ; appointee to reside near main hospitals. 24th July, 1957.

Application forms from the Senior Administrative Medical Officer to the Board, Cheetwood-road, Manchester, 8, to be returned by the dates stated.

NEWCASTLE REGIONAL HOSPITAL BOARD. CONSULTANT E.N.T. SURGEON, whole-time or maximum part-time for a minimum of 9 notional half-days per week at North West Durham and Durham Groups of hospitals. Main hospitals —North West Durham, Shotley Bridge General (530 Beds) ; Maiden Law (108 Beds) ; Durham-Dryburn (300 Beds) ; County (116 Beds). Appointee will be 1 of a team of 2 to work in both areas, and to reside in North West Durham Area.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, within 28 days.

NEWCASTLE REGIONAL HOSPITAL BOARD. East CUMBERLAND GROUP OF HOSPITALS. Locum ORTHOPÆDIC SURGEON, whole-time, or maximum part-time for a period of approximately 2 months from July 14th, 1957. Remuneration at Consultant or Senior Hospital Medical Officer level according to grading of successful applicant.

Applications, with names of 3 referees, to be sent immediately to Senior Administrative Medical Officer, 72, Warwick-road, Carlisle.

NEWCASTLE REGIONAL HOSPITAL BOARD. Special AREA COMMITTEE FOR CUMBERLAND AND NORTH WESTMORLAND. Whole-time SENIOR CASUALTY OFFICER required for East Cumberland Group of hospitals. Main hospital Cumberland Infirmary, Carlisle (340 Beds) ; to work under general supervision of 1 or more Consultant Surgeons and 1 or more Orthopædic Surgeons. In addition to casualty duties doctor appointed will be provided with facilities for gaining experience in general inpatient surgery and orthopædic inpatient surgery and will be required to reside near the Cumberland Infirmary. Appointment for a period not exceeding 4 years, commencing salary within the scale £1653 15s.–£2126 5s. p.a.

Applications, with names and addresses of 3 referees, to the Senior Administrative Medical Officer, 72, Warwick-road, Carlisle, within 28 days.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time ASSISTANT ANÆSTHETIST required for the Barnsley Hospitals. Salary scale £1653 15s.–£52 10s.–£2126 5s.

Application forms and further details from Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield. Forms to be returned by 27th July, 1957.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. Whole-time PSYCHIATRIST (Senior Hospital Medical Officer grade) at Bangour Village Hospital, Broxburn, West Lothian The Hospital is a modern villa type hospital (over 1000 Beds) and is associated with a large General Hospital (over 600 Beds). A house (married) or residential accommodation (single) could be made available, and appropriate deductions made in respect of rent, &c.

Apply, giving particulars of age, qualifications and previous experience, and the names of 3 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 27th July, 1957.

SCOTLAND. NORTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the whole-time, or maximum part-time, post of CONSULTANT RADIOLOGIST to the Regional Hospital Board. The main duties are at the Aberdeen Royal Infirmary, the Maternity Hospital and the Royal Aberdeen Hospital for Sick Children. In addition the successful applicant may be expected to visit other hospitals in the Region.

Applications, giving the names of 2 referees, should be submitted by 19th July, 1957, to the Secretary, North-Eastern Regional Hospital Board, Scotland, 1, Albyn-place, Aberdeen, from whom further particulars may be obtained.

SCOTLAND. NORTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the part-time post of CONSULTANT GENERAL SURGEON (8 notional half-days per week) on the staff of the Aberdeen General Hospitals.

Applications (12 copies), together with the names of 2 referees, should be forwarded by 26th July, 1957, to the Secretary, 1, Albyn-place, Aberdeen, from whom further particulars may be obtained.

SCOTLAND. NORTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the whole-time post of SENIOR HOSPITAL MEDICAL OFFICER to the Regional Tuberculosis Service. The main duties will be at Tor-na-Dee and Glen o' Dee Sanatoria (152 Beds) but will also include work in the Regional Chest Clinic. There is an active Thoracic Surgical Unit at Tor-na-Dee and applicants should have experience in pre- and post-operative care of cases. Residence will be required at or near Tor-na-Dee, which is 6 miles from Aberdeen. Single accommodation is available in the Sanatorium.

Applications, giving the names of 2 referees, should be submitted by 19th July, 1957, to the Secretary, North-Eastern Regional Hospital Board, Scotland, 1, Albyn-place, Aberdeen, from whom further particulars may be obtained.

WELSH REGIONAL HOSPITAL BOARD. Whole-time Locum Tenens SENIOR HOSPITAL MEDICAL OFFICER (orthopædic surgery) required, Neath General Hospital, for 3 weeks commencing 18th July, 1957.

Applications, naming 2 referees, to Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff.

WELSH REGIONAL HOSPITAL BOARD. Whole-time Locum Tenens CONSULTANT ANÆSTHETIST required, West Wales Hospital Management Committee area, 14th July–14th October, 1957.

Applications, naming 2 referees, to Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff.

WELSH REGIONAL HOSPITAL BOARD. Additional CONSULTANT in General Medicine, Pontypridd and Rhondda Hospital Management Committee area, to share in acute medical work and the supervision of chronic sick. Successful applicant will be required to reside within Hospital Management Committee area. Optional whole-time/maximum part-time appointment.

Applications (12 copies), naming 3 referees, to Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff.

WELSH REGIONAL HOSPITAL BOARD. Consultant RADIOLOGIST, Cardiff Hospital Management Committee. Visits to several hospitals in Cardiff and neighbouring Group area. Optional whole-time/maximum part-time appointment.

Applications (12 copies), naming 3 referees, to Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 21 days.

NEW ZEALAND. WAIKATO HOSPITAL, Hamilton, NEW ZEALAND. Applications are invited from suitably qualified medical practitioners of the British Empire for the position of Full-time ORTHOPÆDIC SURGEON at the above Hospital. Preference will be given to applicants possessing postgraduate degrees. Salary in accordance with the Hospital Employment (Medical Officers) Regulations as either :—

(*a*) Senior Registrar £NZ1010–£NZ1170 plus an allowance of £NZ200 in lieu of residence, or

(*b*) Junior Specialist £NZ1640–£NZ1940 (non-resident).

An allowance will be paid on arrival, towards travelling expenses incurred, in travelling to take up appointment.

Conditions of appointment and form of application are available from the Office of the High Commissioner for New Zealand, 415, Strand, London, W.C.2. Applications close with the Secretary, P.O. Box 934, Hamilton, New Zealand, Wednesday, 28th August, 1957. A. C. BURGESS, Secretary.

Hospital Services : Junior Appointments

BETHNAL GREEN HOSPITAL, Cambridge Heath-road, E.2. HOUSE SURGEON required. Gynæcological and obstetrics, pre-registration post. Vacancy 23rd July, 1957.

Applications, stating experience and copies of 2 testimonials, to Hospital Secretary.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. RESIDENT HOUSE OFFICER (pre-registration) required in Orthopædic and Traumatic Department. Post vacant 22nd August, 1957.

Applications, with 2 testimonials, to Medical Director by 13th July.

CHARING CROSS HOSPITAL, W.C.2. Full-time Medical REGISTRAR (non-resident). Tenable from 1st October, 1957, for 1 year in the first instance, with eligibility for renewal.

Applications, on forms obtainable from the undersigned to be returned by 22nd July, 1957.

FRANK HART, Secretary to the Board.

COLINDALE HOSPITAL, Colindale-avenue, London, N.W.9. (300 Beds.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Whole-time SURGICAL REGISTRAR (resident or non-resident), required at above Hospital. Post vacant 1st September, 1957. F.R.C.S. and previous experience an advantage. Work covers surgical treatment of pulmonary, orthopædic, urinary and tuberculous and non-tuberculous chest diseases. The Hospital is situated within easy access to central London and may be visited by arrangement with Physician-Superintendent.

Application forms obtainable from, and returnable to, Group Secretary, Hendon Group Hospital Management Committee, Edgware General Hospital, Edgware, Middlesex, by 16th July, 1957.

CONNAUGHT HOSPITAL, Walthamstow, E.17. (118 Beds.) Applications are invited for the post of SECOND CASUALTY OFFICER with duties in the Department of Orthopædic and Traumatic Surgery (Senior House Officer grade). Recognised for F.R.C.S. Salary £819 10s. p.a., less £150 p.a. for board, lodging, &c.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Hospital Management Committee, Forest Group, Langthorne-road, E.11.

GERMAN HOSPITAL, London, E.8. (General—157 Beds.) Applications for the 6-months resident appointment, vacant 22nd July, of registered HOUSE PHYSICIAN should reach the Group Secretary, Hackney Hospital, London, E.9, by 12th July, quoting GH/HS.

GERMAN HOSPITAL, London, E.8. (General—157 Beds.) Applications are invited for the 6-month resident appointment of Pre-registration HOUSE SURGEON now vacant, and should be sent to the Group Secretary, Hackney Hospital, London, E.9, quoting GH/PHS.

ELIZABETH GARRETT ANDERSON HOSPITAL, Euston-road, N.W.1. (ROYAL FREE HOSPITAL GROUP.) Applications are invited from registered Women medical practitioners for the appointment of Full-time MEDICAL REGISTRAR for general medicine and pædiatrics. Appointment for 1 year in the first instance to commence 1st September, 1957. Salary in accordance with Ministry of Health scale, for Registrar grades.

Applications, with names of 3 referees, should be sent to the Secretary, Elizabeth Garrett Anderson Hospital, by 17th July, 1957.

HACKNEY HOSPITAL, London, E.9. (General—841 Beds.) Applications are invited for the 6-month resident appointment, now vacant, of CASUALTY OFFICER (House Officer grade), AND HOUSE SURGEON (E.N.T.).

Apply immediately, Secretary, above address, quoting HH/CO.

HACKNEY HOSPITAL, London, E.9. (General—841 Beds.) Applications are invited for the 12-month resident appointment of SENIOR HOUSE OFFICER ANÆSTHETIST. The post, now vacant, is recognised for the D.A. and the F.F.A.R.C.S. examinations, and offers wide experience of anæsthesia, with opportunities to study for higher qualifications.

Apply immediately, Secretary, above address, quoting HH/SHO/A.

HAMMERSMITH HOSPITAL AND INSTITUTE OF OBSTETRICS AND GYNÆCOLOGY, Ducane-road, London, W.12. Applications invited for the following whole-time posts, both recognised for M.R.C.O.G.

RESIDENT HOUSE OFFICER (gynæcology), vacant 1st September.

RESIDENT SENIOR HOUSE OFFICER (obstetrics and gynæcology), vacant 1st October.

Applications, stating age, qualifications, experience, names of 2 referees, to Secretary, Board of Governors, The Hammersmith, West London and St. Mark's Hospitals, Ducane-road, London, W.12, by 20th July.

HAMMERSMITH HOSPITAL AND POSTGRADUATE MEDICAL SCHOOL, Ducane-road, London, W.12. Whole-time NON-RESIDENT REGISTRAR (general surgery) required. Post vacant 1st November.

Applications, stating age, qualifications, experience, names of 2 referees, to Secretary, Board of Governors, The Hammersmith, West London and St. Mark's Hospitals, Ducane-road, London, W.12, by 15th July.

HIGHLANDS GENERAL HOSPITAL, Winchmore Hill, N.21. HOUSE SURGEON required, vacant 4th August. Duties mainly orthopædic with some E.N.T. and emergency general surgery. New Operating Theatre, Outpatient and Casualty Department. Post recognised for Pre-registration Service.

Applications, with copies of 3 testimonials and name and address of 1 referee, to Hospital Secretary.

KING'S COLLEGE HOSPITAL, Denmark-hill, S.E.5. Applications are invited for the appointment of SENIOR RESIDENT MEDICAL OFFICER at the Belgrave Hospital for Children, Kennington, from 1st October, 1957, but the appointment to be taken up as soon as possible. The appointment is for 1 year in the first instance and will be in the grade of Registrar.

Applications, stating age, education, qualifications and experience, together with the names of 2 referees, should reach the undersigned not later than 20th July, 1957.

S. W. BARNES, House Governor.

KING'S COLLEGE HOSPITAL, Denmark-hill, S.E.5. Applications are invited for the post of Locum SENIOR REGISTRAR to the Department of Neurology (Dr. Macdonald Critchley and Dr. S. Nevin). The post is tenable from 1st July, 1957, until 31st September, 1957.

Applications, together with the names of 2 referees, should be submitted to the undersigned not later than 20th July, 1957.

S. W. BARNES, House Governor.

LAMBETH HOSPITAL, Brook-drive, S.E.11. Applications are invited from pre-registration and registered medical practitioners for the post of RESIDENT HOUSE SURGEON, vacant 11th August, 1957. The successful candidate will be required to carry out a fortnight's Locum duty starting on 28th July, 1957. The post is recognised for the F.R.C.S.

Application forms from the acting Physician-Superintendent.

LONDON CHEST HOSPITAL. Hospitals for Diseases OF THE CHEST. A vacancy occurs 1st September, 1957, for RESIDENT SURGICAL OFFICER. Appointment for 6 months with prospect of renewal. Post graded as Senior House Officer or Registrar according to qualifications and previous surgical experience.

Applications, stating date of birth, qualifications with dates, and previous appointments held with copies of 3 testimonials, should reach the undersigned not later than 17th July, 1957.

THOMAS BROWN, House Governor.

London Chest Hospital, E.2.

LONDON HOSPITAL, Whitechapel, E.1. Applications are invited for the post of REGISTRAR to the Radiodiagnostic Department. A higher qualification, although desirable, is not essential.

Applications (12 copies), giving the names and addresses of 3 referees, should be received by the undersigned by 12th July, 1957. H. BRIERLEY, House Governor.

LONDON JEWISH HOSPITAL, Stepney Green, E.1. (130 Beds.) HOUSE SURGEON (pre- or post-registration) required for 6 months. Post vacant immediately.

Applications, stating age, experience, &c., and enclosing copies of testimonials, to be sent to the Hospital Secretary.

MEMORIAL HOSPITAL, Shooters Hill, Woolwich, S.E.18. SENIOR HOUSE OFFICER (Casualty Department), vacant 4th August. Recognised for F.R.C.S. 6 months resident appointment and may then be renewed. Salary £819 10s. p.a., less £150 p.a. for residence.

Apply to Group Secretary, Memorial Hospital, Woolwich, S.E.18.

METROPOLITAN HOSPITAL, Kingsland-road, London, E.8. (General—146 Beds.) Applications are invited for the pre-registration post of HOUSE SURGEON, vacant 1st August, 1957.

Applications from provisionally or fully registered candidates, stating age, nationality, qualifications and experience, together with copies of 3 testimonials, to the Hospital Secretary by 16th July, 1957.

METROPOLITAN HOSPITAL, Kingsland-road, London, E.8. CLINICAL ASSISTANT to the Consultant in Psychiatry. Required for 1 half-day session. Experience in short methods of psychotherapy, physical treatments, and abreactive therapy desirable.

Applications, stating qualifications and experience together with names and addresses of 2 referees, to be forwarded to Hospital Secretary by 19th July, 1957.

MILDMAY MISSION HOSPITAL, Austin-street, London, E.2. Applications are invited for the pre-registration post of RESIDENT HOUSE PHYSICIAN AND CASUALTY OFFICER, vacant on 15th July, 1957. Candidates should be in sympathy with the evangelical Christian aims of the Hospital.

Applications and references to be addressed to the Medical Superintendent as soon as possible.

MILDMAY MISSION HOSPITAL, Austin-street, London, E.2. Applications are invited for the pre-registration post of RESIDENT HOUSE SURGEON (post recognised for F.R.C.S.), vacant on 31st July, 1957. Candidates should be in sympathy with the evangelical Christian aims of the Hospital.

Applications and references to be addressed to the Medical Superintendent as soon as possible.

MILE END HOSPITAL, Bancroft-road, London, E.1. (484 Beds.) HOUSE SURGEON (pre- or post-registration). Post vacant 6th August, 1957.

Application forms, obtainable from Physician-Superintendent, should be returned by 19th July with copies of not more than 3 testimonials.

NATIONAL HOSPITALS FOR NERVOUS DISEASES. Applications are invited for the full-time appointment of SENIOR MEDICAL REGISTRAR (non-resident) at the Maida Vale Hospital for Nervous Diseases, London, W.9, which is a joint appointment with The London Hospital. The successful applicant will work for the first and third years at the Maida Vale Hospital and the second and fourth years at The London Hospital in the Neurological Department. Senior Registrar grade. Preference will be given to the candidate holding a higher degree who intends to specialise in neurology.

Applications, with copies of 3 recent testimonials, to be sent to the Secretary to the Board of Governors at the Maida Vale Hospital for Nervous Diseases, London, W.9, not later than 3rd August, 1957.

NEW END HOSPITAL, Hampstead, N.W.3. Registrar (general surgery) required for Surgical Unit of 93 Beds. Vacant now. F.R.C.S. desirable. The Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, Group Secretary, Archway Group Hospital Management Committee, 46, Cholmeley-park, N.6, within 10 days.

NORTH MIDDLESEX HOSPITAL, Edmonton, N.18. CASUALTY OFFICER (Senior House Officer grade). 6 months appointment, starting 19th August, non-resident. Recognised for F.R.C.S. 3 Casualty Officers employed: duties include service with the 3 main Surgical Units.

Applications, stating age, nationality, qualifications experience, with copies of recent testimonials and/or names of 2 referees, to Hospital Secretary, 17th July.

AMENDED ADVERTISEMENT

PADDINGTON GENERAL HOSPITAL, Harrow-road, W.9. (582 Beds.) Applications are invited for the post, commencing 16th September, 1957, of REGISTRAR (obstetrics and gynæcology), whole-time. Resident post recognised for M.R.C.O.G. Department contains 100 obstetric and 38 gynæcological beds. Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, Secretary to Committee, Paddington General Hospital, Harrow-road, W.9, by 17th July.

PRINCE OF WALES'S GENERAL HOSPITAL, N.15. Applications are invited for the appointment of RESIDENT JUNIOR HOUSE PHYSICIAN (pre-registration first or second post) to the above Hospital for a period of 6 months.

Application form from Secretary, Tottenham Group Hospital Management Committee, The Green, N.15, to be returned by 10th July, 1957.

PRINCE OF WALES'S GENERAL HOSPITAL, N.15. Applications are invited for the appointment of RESIDENT SENIOR CASUALTY OFFICER (Senior House Officer) recognised for F.R.C.S. examination, to the above Hospital for a period of 6 months, vacant immediately.

Application form from Secretary, Tottenham Group Hospital Management Committee, The Green, N.15.

QUEEN ELIZABETH HOSPITAL FOR CHILDREN MANAGEMENT COMMITTEE, Hackney-road, E.2, Shadwell, E.1, and BANSTEAD WOOD, SURREY. HOUSE OFFICER. Appointment will be made for 2 consecutive periods of 6 months commencing September 1st, 1957. First period (Shadwell) as House Physician and second as House Surgeon (Banstead) and Casualty Officer (Hackney-road).

Application forms may be obtained from the Secretary at Hackney-road, and should be returned with copies of not more than 3 testimonials, not later than 20th July, 1957.

QUEEN MARY'S HOSPITAL FOR THE EAST END, Stratford, E.15. HOUSE PHYSICIAN (third post) for 6 months commencing 18th August, 1957.

Applications, with names of 2 referees to Hospital Secretary by 20th July, 1957.

ROYAL FREE HOSPITAL GROUP. Applications are invited for the post of SENIOR SURGICAL REGISTRAR for 1 year to work at the Royal Free Hospital and the Hampstead General Hospital, to cover the absence of the present holder abroad. Salary in accordance with the scale laid down by the Ministry of Health—duties to commence as soon as possible.

Applications should be made to the Secretary, Royal Free Hospital, Gray's Inn-road, London, W.C.1, as soon as possible.

ROYAL NORTHERN HOSPITAL. (279 Beds.) North WEST METROPOLITAN REGIONAL HOSPITAL BOARD. REGISTRAR required in the Orthopædic and Fracture Department of the above Hospital. The department has a very large fracture clinic. Candidates may visit Hospital by direct appointment.

Application forms obtainable from, and returnable to, the Secretary, Royal Northern Hospital, Holloway-road, London, N.7, by 16th July, 1957.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for 2 appointments as Whole-time REGISTRAR in General Medicine at Dulwich Hospital, East Dulwich-grove, S.E.22, in the Camberwell Group of hospitals, where there is an association with King's College Hospital Medical School, for teaching purposes. The appointments may be resident or non-resident, but if non-resident the successful candidate will be required to sleep in during nights when on duty. No married quarters are available. The appointments will be in accordance with the terms and conditions of service of hospital medical and dental staffs (England and Wales), and will be for 1 year in the first instance.

Applications, giving particulars of age, qualifications, and experience with relevant dates, together with the names and addresses of 2 referees, to be sent to the Secretary, Registrars Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, W.1, not later than 20th July, 1957.

SOUTH LONDON HOSPITAL FOR WOMEN AND CHILDREN, Clapham Common, S.W.4. Applications are invited for the post of RESIDENT MEDICAL OFFICER (Woman), Senior House Officer grade. Appointment is for 6 months, renewable. Duties include care of children's ward; medical beds; E.N.T. and administration. Offers suitable experience to those intending to enter General Practice. Vacant 1st August, 1957.

Form of application from the Secretary.

ST. CHARLES' HOSPITAL, Ladbroke-grove, W.10. (576 Beds.) HOUSE PHYSICIAN required for pædiatrics, geriatrics and general medical wards—not pre-registration.

Applications, stating age, qualifications, experience, together with the names and addresses of 2 referees, to be sent to the Hospital Secretary immediately.

ST. LEONARD'S HOSPITAL, Nuttall-street, N.1. (Acute general—192 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER in General Medicine. The appointment is for 12 months.

Applications, with 2 testimonials, to the Hospital Secretary by 12th July.

ST. MARY ABBOT'S HOSPITAL, Marloes-road, Kensington, W.8. Applications are invited for appointment as REGISTRAR in Anæsthetics. Position based at St. Mary Abbot's Hospital, but expected to work at other hospitals in Group if required. Post recognised for the D.A. Resident on nights on duty. Position vacant 15th September. Candidates may visit the Hospital by arrangement.

Applications (5 copies) to be submitted by 19th July, 1957, on forms obtainable from, and returnable to, Group Secretary, (L.49.), 5, Collingham-gardens, London, S.W.5.

ST. MARY'S HOSPITAL, Paddington, W.2. Applications are invited from suitably qualified practitioners, for the post of NON-RESIDENT CASUALTY SURGEON. Candidates must have held an appointment as House Surgeon at this Hospital or at another hospital approved by the Board of Governors. The appointment is for a first period of 6 months, with effect from 1st September. Remuneration at Senior House Officer rates.

Applications, stating nationality, date of birth, permanent address, qualifications with dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, not later than 16th July, 1957.

ST. MARY'S HOSPITAL FOR WOMEN AND CHILDREN, Upper-road, Plaistow, London, E.13. HOUSE SURGEON (pre-registration, first or second post) to commence as soon as possible. Duties include general surgery, gynæcology and E.N.T.

Apply to Hospital Secretary not later than 13th July, 1957.

ST. NICHOLAS HOSPITAL, Plumstead, S.E.18. Senior HOUSE OFFICER (Casualty, Orthopædic and Fracture Departments), vacant 11th August. Recognised for F.R.C.S. 6 months resident appointment and may then be renewed. Salary £819 10s. p.a., less £150 p.a. for residence.

Apply to Group Secretary, Memorial Hospital, Woolwich, S.E.18.

TOTTENHAM GROUP HOSPITAL MANAGEMENT COMMITTEE, The Green, N.15. CLINICAL ASSISTANTS (unpaid) in Obstetrics required, Bearsted Memorial Hospital, Stoke Newington, N.16, and Hampton Court.

Applications to Group Secretary.

WESTMINSTER CHILDREN'S HOSPITAL. (West-MINSTER HOSPITAL TEACHING GROUP.) Applications are invited for the post of RESIDENT MEDICAL OFFICER (Registrar) from initially 1st October, 1957, for 1 year, renewable for a second year.

Apply immediately, with names of 3 referees, to the Secretary Westminster Children's Hospital, Vincent-square, S.W.1.

WEST LONDON HOSPITAL, Hammersmith-road, London, W.6. RESIDENT HOUSE SURGEON (general and genito-urinary) required 11th August. Pre-registration candidates considered.

Applications, stating age, qualifications, experience, copies of 2 recent testimonials, to Secretary by 15th July.

WHIPPS CROSS HOSPITAL, London, E.11. Applications are invited from fully registered medical practitioners for the post of HOUSE SURGEON in the Orthopædic Department. Post, recognised for the F.R.C.S., vacant now.

Application form from the Hospital Secretary to be returned by 15th July, 1957.

WHITTINGTON HOSPITAL, Highgate Hill, N.19. SURGICAL REGISTRAR required for unit of 78 Beds for general surgery and urology. Post recognised for F.R.C.S. Vacant 1st October, 1957. Hospital may be visited by direct appointment with Medical Superintendent.

Application forms obtainable from, and returnable to, Secretary, Archway Group Hospital Management Committee, 46, Cholmeley-park, Highgate, N.6, by 15th July, 1957.

ABERDEEN GENERAL HOSPITALS BOARD OF MANAGEMENT. Applications are invited for the appointment of REGISTRAR in Anæsthetics in the Aberdeen Royal Infirmary and Woodend General Hospital. Conditions of service in accordance with the terms issued by the Department of Health for Scotland.

Applications, with the names of 2 referees, should be lodged immediately with the Group Secretary, Aberdeen General Hospitals, P.O. Box No. 92, 62, Queen's-road, Aberdeen.

ABERDEEN SPECIAL HOSPITALS BOARD OF MANAGEMENT. Applications are invited for the post of REGISTRAR in Chest Diseases for duties in the Regional Chest Clinic and at Tor-na-Dee and Glen O' Dee Sanatoria. A Thoracic Surgery Unit is located at Tor-na-Dee and the appointment offers valuable training in the assessment and selection of cases for major chest surgery and in their preoperative and postoperative management. Residence will be required at or near Tor-na-Dee and single accommodation is available in the Sanatorium itself.

Applications, together with the names and addresses of 2 referees, should be sent to the Secretary, Board of Management, Aberdeen Special Hospitals, 6, Queen's-terrace, Aberdeen, as soon as possible after the appearance of this advertisement.

ABBOTS LANGLEY, WATFORD, HERTFORDSHIRE. LEAVESDEN HOSPITAL. (2250 Beds. Recognised for D.P.M.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. REGISTRAR in Psychiatry (mental deficiency) at above Hospital. Resident accommodation available. Hospital may be visited by direct appointment with Physician-Superintendent.

Application forms obtainable from, and returnable to, Group Secretary, Leavesden Hospital, Abbots Langley, Watford, Herts, by 20th July, 1957.

ALTRINCHAM GENERAL HOSPITAL. Assistant Senior SURGICAL OFFICER (Junior Hospital Medical Officer grade). Applications are invited for this post in a hospital of 130 acute beds with a busy Casualty Department. The appointee would be required to exercise control of this Department and also to assist Resident Surgical Officer with the general surgical work of the Hospital. The post offers excellent opportunities of practical experience and postgraduate study to suitably qualified candidates and particularly those studying for higher surgical qualifications.

Applications, with names of 2 referees, to Group Secretary, North and Mid-Cheshire Hospital Management Committee, Sinderland-road, Altrincham.

ASHFORD HOSPITAL, Ashford, Middlesex. (560 Beds.) STAINES GROUP HOSPITAL MANAGEMENT COMMITTEE. Required, RESIDENT HOUSE SURGEON for Traumatic and Orthopædic Unit. 6 months appointment, suitable for pre-registration candidate.

Applications, stating age, qualifications and experience with copies of up to 3 recent testimonials, to Medical Director of Hospital immediately.

ASHINGTON HOSPITAL. (52 Beds.) Wansbeck Hospital MANAGEMENT COMMITTEE. Applications are invited for the post of HOUSE OFFICER, becoming vacant 7th July. This is a pre-registration post and the work is predominantly surgical, but some medical duties will need to be undertaken.

Applications, with full particulars and names of referees, to be sent as early as possible to the Group Secretary, Wansbeck Hospital Management Committee, 12, Stanley-street, Blyth, Northumberland.

ASHTON, HYDE AND GLOSSOP HOSPITAL MANAGEMENT COMMITTEE.

2 HOUSE PHYSICIANS required at Ashton-under-Lyne General Hospital. 1 post vacant end of July, 1 vacant mid-August. Preference given to pre-registration candidates.

HOUSE OFFICER (midwifery) required. Post recognised for D.Obst.R.C.O.G., vacant mid-August. Preference given to pre-registration candidates.

Applications, with copies of 2 testimonials, to Group Secretary, General Hospital, Ashton-under-Lyne, Lancs.

ASHTON, HYDE AND GLOSSOP HOSPITAL MANAGEMENT COMMITTEE. HOUSE OFFICER (pædiatrics) required at Ashton-under-Lyne General Hospital. Modern Pædiatric Unit, good neonatal and premature baby experience. Recognised for D.C.H. Vacant end of August, 1957.

Applications, with copies of 2 testimonials, to Group Secretary, General Hospital, Ashton-under-Lyne, Lancs.

ASHTON, HYDE AND GLOSSOP HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (obstetrics/gynæcology) required at Ashton-under-Lyne General Hospital. Bed complement 75 obstetric and 26 gynæcology. Recognised for M.R.C.O.G. Vacant end of August, 1957.

Applications, with copies of 2 testimonials, to Group Secretary, General Hospital, Ashton-under-Lyne, Lancs.

AYLESBURY, BUCKINGHAMSHIRE. STOKE MANDEVILLE HOSPITAL. RESIDENT HOUSE PHYSICIAN for the Neurological Unit (a part of the Department of Neurology of the United Oxford Hospitals). Vacant 1st August, 1957. Recognised pre-registration post, also open to registered practitioners, in which case status up to Senior House Officer may be awarded.

Applications, with copies of 2 testimonials, to the Administrative Officer.

AYLESBURY, BUCKINGHAMSHIRE. STOKE MANDEVILLE HOSPITAL. PLASTIC SURGERY AND JAW INJURIES UNIT. (NUFFIELD BURNS UNIT.) Applications are invited for the post of RESIDENT SENIOR HOUSE OFFICER in the above department of the Hospital. Duties will include care of patients in the Burns Unit (under supervision), and also work in general plastic wards and the theatre.

Applications, with the names of 2 referees, to the Administrative Officer.

BANGOR. CAERNARVON AND ANGLESEY GENERAL AND MINFFORDD HOSPITALS. Applications are invited for the non-resident post of JUNIOR HOSPITAL MEDICAL OFFICER to the E.N.T. and other Special Departments (Dermatology, Oral Surgery, Bronchoscopy Clinic, &c.) at the above Hospitals. The successful applicant will be expected to reside within easy reach of both hospitals. Salary and conditions of service in accordance with Whitley Council agreements.

Applications, stating age, nationality, qualifications, experience, together with the names and addresses of 2 referees, to be forwarded to the Group Secretary, Caernarvon and Anglesey Hospital Management Committee, Plas Gwyn, Ffriddoedd-road, Bangor, within 14 days of the appearance of this advertisement.

BEBINGTON, WIRRAL, CHESHIRE. CLATTERBRIDGE HOSPITAL. (819 Beds.) CENTRAL WIRRAL GROUP. JUNIOR HOSPITAL MEDICAL OFFICER (Casualty/Orthopædics) resident, to commence 1st September, 1957. Salary in accordance with current terms and conditions of service, i.e., £852 10s.–£55–£1182 10s. p.a., less £170 p.a. for residential facilities.

Application forms, obtainable from Group Secretary, to be returned by 15th July, 1957.

BEDFORD GENERAL HOSPITAL. (436 Beds.) House SURGEON required. Pre- or post-registration. Recognised for F.R.C.S. Post offers exceptional opportunities for general experience in busy acute Surgical Units.

Inquiries and applications, with copies of 2 recent testimonials, to Group Secretary, 3, Kimbolton-road, Bedford.

BEVERLEY, YORKSHIRE. WESTWOOD HOSPITAL. (229 Beds.) Locum ORTHOPÆDIC HOUSE SURGEON (Senior House Officer or House Officer grading according to experience).

Applications to Group Secretary.

BEVERLEY, YORKSHIRE. WESTWOOD HOSPITAL. (229 acute beds.) ORTHOPÆDIC HOUSE SURGEON (first, second or third post), vacant now. Offers good opportunity for general experience in busy acute general hospital. Approved pre-registration post. Fully qualified practitioners may apply. Recognised for F.R.C.S.

Apply Group Secretary.

BEXHILL HOSPITAL, Bexhill. (62 Beds.) Resident HOUSE SURGEON required. Pre-registration post vacant now. National scale of salary.

Apply to Hospital Administrator.

BIRMINGHAM ACCIDENT HOSPITAL, Bath-row, BIRMINGHAM, 15. (215 Beds and 8 House Surgeons.) HOUSE SURGEONS (resident), now vacant. Hospital largest Traumatic Unit in country and treats over 50,000 new patients each year. Recognised for purpose of casualty by R.C.S. (Eng.). Teaching programme by Consultant staff. 6-month appointment, some of which may be spent in 42-bedded Medical Research Council's Burns Unit.

Apply, naming 2 referees, to Administrator by 23rd July, 1957.

BIRMINGHAM, 18. ALL SAINTS' HOSPITAL. Junior HOSPITAL MEDICAL OFFICER (resident) required. The post is subject to the terms and conditions of service for medical staff under National Health Service superannuation regulations. The Hospital offers training in all modern treatments, has a large Outpatient Department and an E.E.G. Department, and is associated for research with the University of Birmingham. Facilities for D.P.M. course available.

Applications, stating age and qualifications, to the Medical Superintendent.

BIRMINGHAM. MOSELEY HALL HOSPITAL FOR CHILDREN, Alcester-road, BIRMINGHAM, 13. (65 Beds.) SENIOR HOUSE OFFICER (pædiatric), vacant 1st September, 1957. Resident/non-resident. Recognised for D.C.H.

Apply, with 3 testimonials, by 17th July to Secretary, Birmingham (Selly Oak) Hospital Management Committee, Oak-Tree-lane, Birmingham, 29.

BIRMINGHAM, 15. ROYAL ORTHOPÆDIC HOSPITAL. SENIOR HOUSE OFFICER. Preferably with orthopædic experience. Recognised by Royal College of Surgeons. 334 Beds for long and short term orthopædic cases (non-traumatic) and extensive outpatient services.

Applications, with testimonials or names of referees, to Administrator.

BIRMINGHAM REGIONAL HOSPITAL BOARD. Senior REGISTRARS in Psychiatry.

(*a*) Shelton Hospital, Shrewsbury (972 Beds). Wide experience specialty and higher qualification required. Resident. Single or married accommodation available.

(*b*) 2 appointments at All Saints' Hospital (1385 Beds) and Ufculme Early Treatment Centre, Birmingham. May be required to reside in Hospital when on duty. Experience specialty and D.P.M. required.

Application forms from Secretary, Regional Hospital Board, 10, Augustus-road, Birmingham, 15, to be returned by 22nd July, 1957.

BIRMINGHAM REGIONAL HOSPITAL BOARD.

(1) **Birmingham (Dudley Road) Group, Dudley Road Hospital, Birmingham, 18**

REGISTRAR (E.N.T. surgery), non-resident, for Dudley Road Hospital (approximately 40 E.N.T. beds). Post recognised for D.L.O.

(2) **Birmingham (Selly Oak) Group, Oak Tree-lane, Birmingham, 29**

REGISTRAR (E.N.T. Department—42 Beds), Selly Oak Hospital (1055 Beds). Non-resident. Experience specialty and higher qualification an advantage.

(3) **Stoke-on-Trent Group, Princess-road, Stoke-on-Trent**

(*a*) REGISTRAR (medical) for City General Hospital (815 Beds). Higher qualification desirable but not essential. Duties in acute Medical Unit (150 Beds) and large Outpatients Department. Facilities for research particularly in cardiology and respiratory diseases.

(*b*) REGISTRAR (obstetrics and gynæcology). Duties at City General and Limes Maternity Hospital (Obstetrics 100 Beds, Gynæcology 40 Beds). Experience specialty essential. Resident/non-resident, unfurnished house may be available for married man. Recognised for M.R.C.O.G./D.Obst.R.C.O.G. Vacant 8th August.

(4) **Dudley, Stourbridge Group, The Guest Hospital, Dudley**

(*a*) REGISTRAR (anæsthetics). Experience specialty essential. Duties at The Guest, Corbett and Wordsley Hospital. Opportunity for experience in general surgery, gynæcology, orthopædics, and plastic surgery with the Regional Plastic Surgery Unit. Resident at Wordsley Hospital. Married accommodation available.

(*b*) REGISTRAR (general surgery) for The Guest Hospital, Dudley (154 Beds). Experience specialty essential. Higher qualification desirable. Resident.

(5) **Wolverhampton Group, The Royal Hospital, Wolverhampton**

REGISTRAR (pathology), resident or partly resident. Experience in specialty an advantage. Duties in all branches of clinical pathology centred on the Royal Hospital.

Application forms from Group Secretaries to be returned by 15th July, 1957.

BARNSTAPLE. NORTH DEVON INFIRMARY. (105 Beds.) HOUSE PHYSICIAN (pre-registration) required. Post vacant mid-July.

Applications to Group Secretary, North Devon Hospital Management Committee, 19, Alexandra-road, Barnstaple.

BISHOP AUCKLAND, co. DURHAM. THE GENERAL HOSPITAL. (350 Beds.) SOUTH WEST DURHAM HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIAN required. Fully registered practitioner or pre-registration candidate.

Apply, naming 2 referees, to K. G. T. LUXFORD, Group Secretary, at the above address.

BISHOP'S STORTFORD, HERTFORDSHIRE. HERTS AND ESSEX GENERAL HOSPITAL. (400 Beds.) Applications are invited for the post of HOUSE OFFICER (surgical), pre-registration. Salary £467 10s.–£522 10s. p.a., less £125 in respect of residential emoluments. Appointment to commence 8th August, 1957.

Applications, stating age, nationality, qualifications and experience with copies of 2 recent testimonials or the names of referees, to the Hospital Secretary.

BLACKBURN AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (pathology) required for duties at Royal Infirmary, Blackburn (Group Laboratory), but may also be required for duties at Queen's Park Hospital, Blackburn, and Victoria Hospital, Accrington, at Consultant's discretion. Recognised for D.Path. Post vacant 2nd October, 1957.

Applications, with names of 2 referees, to Group Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn.

BLACKPOOL. VICTORIA HOSPITAL. Blackpool and FYLDE HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER required for casualty and traumatic surgery. Recognised for F.R.C.S. and offering wide variety of experience.

Applications, stating age, qualifications and experience and giving the names and addresses of 2 referees, should be sent to the Group Secretary.

BLACKPOOL. VICTORIA HOSPITAL. (354 Beds.) HOUSE OFFICER (orthopædic and traumatic surgery). Resident pre-registration post recognised for F.R.C.S. available from 22nd July, 1957, in the main acute general hospital serving the Blackpool and Fylde area.

Applications, stating age, experience (if any) and giving the names and addresses of 2 referees, should be sent to the Hospital Secretary.

BOLTON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE.

The Royal Infirmary, Bolton (237 Beds)

RESIDENT HOUSE SURGEONS (3) for general surgical duties. Vacant now, 16th July and 8th August.

Bolton District General Hospital (607 Beds)

RESIDENT HOUSE SURGEON, vacant 22nd August.

All 4 posts tenable for 6 months and recognised under Pre-registration Scheme. Also recognised for F.R.C.S.

Applications, with names of 2 referees, to Group Secretary, The Royal Infirmary, Bolton.

BURY AND ROSSENDALE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER in Anæsthetics, to the above Group of hospitals. The post, which will become vacant on 1st October, 1957, is based at Bury General Hospital, and is recognised for the D.A. examination.

Apply, stating full details, and names of 2 referees, to—

H. WILKINSON, Esq., Group Secretary.

Bury General Hospital, Walmersley-road, Bury, Lancs.

BURY AND ROSSENDALE HOSPITAL MANAGEMENT COMMITTEE. BURY GENERAL HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER in Casualty and Orthopædics. This post is recognised for the F.R.C.S.

Full details, including nationality, age, qualifications, and experience, with the names of 2 referees, should be forwarded to—

H. WILKINSON, Group Secretary.

Bury General Hospital, Bury, Lancs.

BOURNEMOUTH. ROYAL VICTORIA HOSPITAL, Shelley-road. (494 Beds.) BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of HOUSE PHYSICIAN. The appointment, which is recognised for pre-registration purposes, becomes vacant on 28th August, 1957.

Applications to the Hospital Secretary.

BOURNEMOUTH. ROYAL VICTORIA HOSPITAL, Shelley-road. (492 Beds.) BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of GENERAL HOUSE SURGEON. The appointment, which is recognised for the F.R.C.S. examination and pre-registration purposes, becomes vacant on 15th July, 1957.

Applications to the Hospital Secretary.

BRIGHTON GENERAL HOSPITAL. Applications are invited for the appointment of HOUSE SURGEON to the Orthopædic Unit. Salary in accordance with national scale. This post is recognised as a pre-registration appointment.

Applications, stating age, qualifications, and experience, and giving the names of 2 referees, should be sent to the Physician-Superintendent, Brighton General Hospital, Elmgrove, Brighton.

BRIGHTON. ROYAL SUSSEX COUNTY HOSPITAL. (312 Beds.) 2 CASUALTY HOUSE SURGEONS (duties include work in Orthopædic and Traumatic Unit), vacant beginning and end July. Posts recognised for pre-registration and F.R.C.S.

Applications, stating usual particulars, and naming 2 referees, to the Administrative Officer, Royal Sussex County Hospital, Brighton, 7.

BRIGHTON. ROYAL SUSSEX COUNTY HOSPITAL. Locum REGISTRAR in General Surgery required at the above Hospital, vacant early July.

Applications, stating age, qualifications and experience, and naming 2 referees, to the Group Secretary, Brighton and Lewes Hospital Management Committee, Royal Sussex County Hospital, Brighton, 7, from whom further information regarding the post may be obtained.

BRIGHTON. ROYAL ALEXANDRA HOSPITAL FOR SICK CHILDREN, Dyke-road. (130 Beds and Cots.) BRIGHTON AND LEWES HOSPITAL MANAGEMENT COMMITTEE. Vacancy for SENIOR HOUSE OFFICER from 21st August, 1957. Salary at the rate of £819 10s. p.a., less £150 p.a. for residential emoluments. Candidates should have had experience in pædiatrics. The post is recognised for D.C.H.

Applications, stating age, nationality, experience, together with copies of 2 testimonials and the names of 2 referees, should reach the Administrative Officer not later than 18th July, 1957.

BRISTOL. COSSHAM AND FRENCHAY HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER required for the Department of Thoracic Surgery (120 Beds) at Frenchay Hospital.

Apply to Group Secretary, Frenchay Hospital, Bristol, giving age and experience and quoting 2 referees.

BURTON GENERAL HOSPITAL AND ANDRESSEY HOSPITAL, BURTON-ON-TRENT. HOUSE SURGEON (gynæcological and obstetrics) required at above Hospital as from 1st July, 1957. Post recognised for pre-registration purposes.

Apply Group Secretary.

BURTON-ON-TRENT. THE GENERAL HOSPITAL. HOUSE SURGEON (general—pre-registration) required at the above Hospital as from 1st August, 1957. Post recognised for F.R.C.S.

Applications to Group Secretary as soon as possible.

BURTON-ON-TRENT. GENERAL HOSPITAL. Junior HOSPITAL MEDICAL OFFICER ANÆSTHETIST required at the above Hospital. Flatlet (furnished or unfurnished) available shortly.

Applications to Group Secretary, General Hospital, Burton on-Trent, as soon as possible.

BURTON-ON-TRENT (near). BRETBY HALL ORTHOPÆDIC HOSPITAL. (78 available orthopædic beds.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (orthopædics) required for inpatient and operative work with children and adults. Hospital quarters available. Duties include certain outpatient responsibilities at Derbyshire Royal Infirmary. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 15th July, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

CAMBRIDGE. ADDENBROOKE'S HOSPITAL. House SURGEON for 6 months from 1st September. Recognised Pre-registration Service.

Apply, stating age, nationality, qualifications, and experience with dates, and copies of 3 testimonials, to Secretary by 17th July. Interviews 24th July.

CARSHALTON, SURREY. QUEEN MARY'S HOSPITAL FOR CHILDREN. (General Children's Hospital of 720 Beds.) Whole-time ANÆSTHETIC REGISTRAR. The surgery practice of the Hospital includes emergency, orthopædic, E.N.T., and general surgery, and there is a special Surgical Unit in association with the Hospital for Sick Children, Great Ormond-street. The post is recognised by the Faculty of Anæsthetists. Applicants are invited to visit the Hospital by appointment with the Physician-Superintendent.

Applications, on forms obtainable from the Group Secretary, should be submitted by 20th July, 1957.

CARSHALTON, SURREY. QUEEN MARY'S HOSPITAL FOR CHILDREN. Locum ANÆSTHETIC REGISTRAR required from 29th July, 1957, for an indefinite period.

Apply Group Secretary (Wallington 6635, Ext. 27).

CARSHALTON, SURREY. ST. HELIER HOSPITAL. 2 HOUSE PHYSICIANS (approved for Pre-registration Service), vacant end July.

Applications, stating age, experience and qualifications, with copies of recent testimonials or the names of 2 referees, should be sent to Secretary at above address.

CANTERBURY. KENT AND CANTERBURY HOSPITAL. (277 Beds.) The post of SENIOR HOUSE PHYSICIAN becomes vacant early in August, 1957. Salary £745 p.a., with National Health Service conditions.

Applications, together with copies of 2 recent testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CARDIFF. THE UNITED CARDIFF HOSPITALS. Applications are invited for the appointment of REGISTRAR in Ophthalmology at the Cardiff Royal Infirmary, to commence mid-August or as soon as possible after that date.

Application forms are available from the Secretary to the Board at the Cardiff Royal Infirmary, Newport-road, Cardiff, and should be returned within 14 days of the appearance of this advertisement.

CARDIFF. THE UNITED CARDIFF HOSPITALS. Applications are invited for the appointment of REGISTRAR (resident) in the Department of Child Health, to commence September/October. Post offers neonatal experience.

Application forms are available from the Secretary to the Board at the Cardiff Royal Infirmary, Newport-road, Cardiff, and should be returned within 14 days of the appearance of this advertisement.

CARDIFF. ST. DAVID'S HOSPITAL. Senior House OFFICER (may be Locum) required for Accident Unit at above Hospital.

Form of application from Group Secretary, Cardiff Hospital Management Committee, 44, Cathedral-road, Cardiff.

CARDIFF. ST. DAVID'S HOSPITAL. Senior House OFFICER (resident) required for Geriatric Unit (200 Beds) at above Hospital, commencing 1st August, 1957.

Form of application from Group Secretary, Cardiff Hospital Management Committee, 44, Cathedral-road, Cardiff.

CARLUKE, LANARKSHIRE. LAW HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER (anæsthetics).

Applications, stating age, qualifications and previous experience, together with the names of 2 referees, should be submitted to the Group Medical Superintendent, Law Hospital, Carluke.

CARLUKE, LANARKSHIRE. LAW HOSPITAL. Applications are invited for the following resident posts (pre- or post-registration) for the 6 months commencing 1st August, 1957.

HOUSE OFFICER (orthopædic).

HOUSE OFFICER (surgical).

Applications, stating age, qualifications and previous experience, together with the names of 2 referees, should be submitted to the Group Medical Superintendent, Law Hospital, Carluke.

CARLISLE. GARLANDS HOSPITAL. Garlands Hospital MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of SENIOR HOUSE OFFICER at the above Mental Hospital. Salary £819 10s. p.a. Flat is available for which a deduction will be made. Appointment subject to the National Health Service superannuation regulations and to the conditions and terms of service laid down by the Minister of Health.

Applications, stating age, qualifications and experience and the names of 2 referees, should be sent to the Medical Superintendent as soon as possible.

CHELMSFORD HOSPITALS. Applications are invited for the post of RESIDENT ANÆSTHETIST (Senior House Officer) to large surgical units.

Applications, stating age, qualifications, and experience, with recent testimonials, should be sent to the Secretary, Chelmsford Hospital Management Committee, London-road, Chelmsford.

CHELMSFORD, ESSEX. BROOMFIELD HOSPITAL. Required, experienced Locum Tenens SENIOR REGISTRAR for 1 year, full residence or only when on duty. Unit has 312 Beds for the treatment of pulmonary tuberculosis in adults. Tuberculous and non-tuberculous thoracic surgery, chest clinics, and mass radiography.

Apply Physician-Superintendent.

CHEPSTOW, MONMOUTHSHIRE. ST. LAWRENCE HOSPITAL. (127 plastic surgery, 50 orthopædic beds.) **PLASTIC SURGERY, JAW INJURIES AND BURNS CENTRE.** SENIOR HOUSE OFFICER in Plastic Surgery required. There are 2 residents in plastic surgery and 1 in orthopædics. Post tenable 6 or 12 months as desired, and candidates experienced in another specialty wishing to gain plastic surgery experience will be considered. Salary £819 10s., less £150 board-residence.

Write, quoting 2 referees, to T. A. JONES, Group Secretary. 64, Cardiff-road, Newport, Mon.

CHESTERFIELD ROYAL HOSPITAL. House Officer or SENIOR HOUSE OFFICER required 17th August, 1957, for Casualty Department. Post recognised for the F.R.C.S. and Pre-registration Service.

Please apply, with copies of 2 testimonials, to—

M. H. BOONE, Group Secretary.

CHICHESTER. ROYAL WEST SUSSEX HOSPITAL. (202 acute beds.) SENIOR HOUSE SURGEON (Deputy Resident Surgical Officer) required at above Hospital. Post recognised for F.R.C.S. Resident staff of 6—Resident Surgical Officer, 3 House Surgeons, Resident Medical Officer, and House Physician. Salary £819 10s. p.a., less residential charge. Vacant 4th August, 1957.

Applications, stating age, experience, qualifications with references, or names of referees, to Senior Administrative Officer.

CHICHESTER. ROYAL WEST SUSSEX HOSPITAL. CHICHESTER GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. RESIDENT MEDICAL REGISTRAR required August or September for duty primarily at Royal West Sussex Hospital (202 Beds) with care, under Consultant Physicians, of 60 adult medical and 10 children's beds; also assisting Dermatologist and Physical Medicine Physician. Whitley Council terms and National Health Service superannuation regulations. Salary £935 first year, £1061 10s. second, each less £170 for residence. Candidates may visit Hospital. Canvassing disqualifies.

Forms, from Group Secretary, 174, Broyle-road, Chichester, to be submitted within 14 days.

CHICHESTER. ST. RICHARD'S HOSPITAL. (400 Beds.) CHICHESTER GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post of RESIDENT SURGICAL OFFICER (Registrar), vacant for 1 year in first instance. Hospital recognised for F.R.C.S. Salary £935 first year, less £170 p.a. for residence.

Forms of application from Group Secretary, 174, Broyle-road, Chichester.

COLCHESTER GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for :—

Essex County Hospital, Colchester, Essex (185 Beds)

Post of HOUSE OFFICER (surgical). First, second, third or pre-registration post, tenable for 6 months. Recognised for F.R.C.S.

Post of HOUSE PHYSICIAN (first, second, third or pre-registration post), tenable for 6 months.

Post of Locum Tenens ANÆSTHETIC REGISTRAR. For 2 weeks commencing 8th July, 1957, for duties at Essex County Hospital and other hospitals in Group.

Essex County Hospital (19 gynæcological beds)
Colchester Maternity Hospital (22 obstetric beds)

Post of HOUSE OFFICER (Male or Female), obstetric and gynæcological. First, second, third or pre-registration post; tenable for 6 months.

Black Notley Hospital, Braintree, Essex (516 Beds)

Post of HOUSE SURGEON (first, second, third or pre-registration post). Includes duties in general surgical and gynæcological wards. Recognised for F.R.C.S.

Applications, with copies of 3 testimonials, to Group Secretary, Colchester Hospital Management Committee, 14, Pope's-lane, Colchester, Essex.

COULSDON, SURREY. NETHERNE HOSPITAL. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of REGISTRAR (whole-time) at the above Hospital, which is recognised for the D.P.M. The Hospital has an admission-rate of 1600 a year and all modern forms of treatment are carried out. There are 4 active Out-patient Departments in general hospitals and Departments of Clinical Research, Neurosurgery, Psychology and Social Service and a modern Electro-encephalographic Unit.

Application forms may be obtained from the Secretary.

CREWE AND DISTRICT MEMORIAL HOSPITAL. REGISTRAR (Orthopædic Department) required. Modern Theatres and Accident Department, incorporating every facility. Full traumatic and orthopædic service being developed. Vacant 1st August, 1957. Salary and conditions as per regulations.

Applications, stating age, qualifications and experience, together with names of 3 referees, to Group Secretary, South Cheshire Hospital Management Committee, Barony Hospital, Nantwich.

DOUGLAS. NOBLE'S ISLE OF MAN HOSPITAL. (160 Beds.) Applications are invited for the post of HOUSE PHYSICIAN, approved for Pre-registration Service. Establishment of 4 House Officers. Post becomes vacant mid-August, 1957, and offers varied experience. National Health Service salary and conditions of service.

Apply to the Secretary, Noble's Isle of Man Hospital, Douglas.

DERBY. DERBYSHIRE CHILDREN'S HOSPITAL. (86 Beds.) HOUSE SURGEON (pre-registration) or SENIOR HOUSE OFFICER required. Vacant immediately. Recognised for D.C.H.

Applications, stating full particulars, together with copies of 2 recent testimonials, to be sent as soon as possible to Secretary.

DERBY. DERBYSHIRE HOSPITAL FOR WOMEN, FRIAR GATE. HOUSE SURGEON (pre-registration) or SENIOR HOUSE OFFICER (gynæcology) required 28th August. Recognised for M.R.C.O.G. in gynæcology only.

Apply, stating full details with copies of 2 recent testimonials, to Group Secretary, Derbyshire Royal Infirmary, Derby.

DERBY. DERBYSHIRE ROYAL INFIRMARY. (416 Beds.) SENIOR HOUSE OFFICER (casualty) required 1st August or earlier. Recognised for periods of 6 months casualty training for F.R.C.S.

Apply, stating age, experience, and 2 names for reference, to Secretary.

DERBY. DERBYSHIRE ROYAL INFIRMARY (416 Beds) **AND DERBY CITY HOSPITAL (200 Beds).** (Recognised for D.A. and F.F.A.R.C.S.) **SHEFFIELD REGIONAL HOSPITAL BOARD.** Whole-time RESIDENT REGISTRAR (anæsthetics) required for the above hospitals. Duties also at other hospitals in the Group. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield by 15th July, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

DERBY. CITY HOSPITAL. Derby No. 1 Hospital Management COMMITTEE. Applications are invited for the posts of HOUSE SURGEONS (2 vacancies) (pre-registration) or SENIOR HOUSE OFFICER (surgical). Both posts are recognised for the F.R.C.S. and will be vacant 11th September, 1957.

Applications, stating full details, together with copies of 2 recent testimonials, should be sent to the Medical Superintendent, City Hospital, Derby, as soon as possible.

DERBY. CITY HOSPITAL. Derby No. 1 Hospital Management COMMITTEE. Applications are invited for the posts of HOUSE PHYSICIANS (2 vacancies). 1 vacancy for a Pre-registration or Senior House Officer (medical) 1 vacancy for a Senior House Officer (medical). Both posts will be vacant on 11th September, 1957.

Applications, stating full details, together with copies of 2 recent testimonials, should be sent to the Medical Superintendent, City Hospital, Derby, as soon as possible.

DRIFFIELD, YORKSHIRE. EAST RIDING GENERAL HOSPITAL. (247 Beds.) HOUSE PHYSICIAN (approved pre-registration post). Fully qualified practitioners may apply. Duties include acute and chronic medicine. Good general experience for first house appointment.

Apply Group Secretary, Westwood Hospital, Beverley, Yorkshire.

EAST ANGLIAN REGIONAL HOSPITAL BOARD.

Norfolk and Norwich Hospital

REGISTRAR in Ophthalmology. Recognised for D.O. and F.R.C.S. Appointment for 1 year renewable for second year.

United Norwich Hospitals

SURGICAL REGISTRAR. Main duties at West Norwich Hospital with Outpatient clinics at Norfolk and Norwich Hospital. Recognised for F.R.C.S. Appointment for 1 year renewable for second year.

Applications, stating age, experience and names of 3 referees, to the Board's Senior Administrative Medical Officer, 117, Chesterton-road, Cambridge, by 15th July. Candidates invited to visit by direct arrangement with Hospital Management Committee Secretary, Norfolk and Norwich Hospital, Norwich.

EBBW VALE GENERAL HOSPITAL. (General Beds 71—Maternity 15.) Applications are invited for the appointment of a SENIOR HOUSE OFFICER. The Hospital is an active Surgical Unit and the Medical staff consists of a Resident Surgeon and Junior Hospital Medical Officer and visiting Orthopædic, Gynæcological and Ophthalmic Surgeons. The tenure of appointment shall be for a period of 12 months.

Apply, giving full details and references, to Group Secretary, North Monmouthshire Hospital Management Committee, Nevill Hall, Abergavenny, Mon.

EDGWARE GENERAL HOSPITAL, Edgware, Middlesex. (702 Beds.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. MEDICAL REGISTRAR (whole time), non-resident, required immediately at above Hospital which may be visited by arrangement with Medical Director.

Application forms obtainable from, and returnable to, Group Secretary, Hendon Group Hospital Management Committee, by 16th July, 1957.

EDGWARE GENERAL HOSPITAL, Edgware, Middlesex. (702 Beds.) RESIDENT SENIOR CASUALTY HOUSE OFFICER required at above Hospital. Post vacant 16th August, 1957, and recognised for F.R.C.S. purposes.

Apply, stating age, nationality, qualifications and experience, together with the names and addresses of 2 referees, to Group Secretary, Edgware General Hospital by 20th July, 1957.

EDGWARE GENERAL HOSPITAL, Edgware, Middlesex. RESIDENT DENTAL HOUSE SURGEON for above Hospital. Post vacant 21st July, 1957. Applicants should have registered dental qualifications. 6 months appointment. Post offers wide experience and is approved for the Dental Fellowship (England and Edinburgh).

Applications, stating age, qualifications, experience and enclosing copies of up to 3 recent testimonials, to Medical Director of Hospital by 20th July, 1957.

EDGWARE GENERAL HOSPITAL, Edgware, Middlesex. (702 Beds.) RESIDENT HOUSE PHYSICIAN for Thoracic and Dermatological Departments. Duties to include "taking of acute general medical cases." 6 months appointment. Post vacant 4th August, 1957.

Applications, stating age, qualifications, experience, and enclosing copies of up to 3 recent testimonials, to Medical Director of Hospital by 20th July, 1957.

EDINBURGH NORTHERN GROUP OF HOSPITALS. RESIDENT ANÆSTHETIST required for Eastern General Hospital. Salary scale £467 10s.–£577 10s. This post is recognised for the Diploma in Anæsthetics.

Applications, with names and addresses of 2 referees, to the Medical Superintendent, Western General Hospital, Edinburgh, 4.

EDINBURGH. ROYAL EDINBURGH HOSPITAL FOR MENTAL AND NERVOUS DISORDERS BOARD OF MANAGEMENT. Applications are invited for appointment of SENIOR HOUSE OFFICER (resident or non-resident), to work in the Professorial Unit of the Jordanburn Nerve Hospital, which is attached to University Department of Psychological Medicine. Appointment for 1 year from 1st October, 1957.

Applications, stating qualifications, experience, and names of 2 referees, to Physician-Superintendent, Royal Edinburgh Hospital, Morningside-place, Edinburgh, 10, within 2 weeks of appearance.

EDINBURGH. ROYAL EDINBURGH HOSPITAL FOR MENTAL AND NERVOUS DISORDERS BOARD OF MANAGEMENT. Applications are invited for appointment of 2 SENIOR HOUSE OFFICERS (resident or non-resident) in this teaching Hospital with good opportunities of training in psychiatry. Appointment for 1 year from 1st October, 1957.

Applications, stating qualifications, experience, and names of 2 referees, to Physician-Superintendent, Royal Edinburgh Hospital, Morningside-place, Edinburgh, 10, within 2 weeks of appearance.

EPPING. ST. MARGARET'S HOSPITAL. House SURGEON (pre- or post-registration) to very busy General Surgical Unit. Hospital within easy reach of Central London. Post now vacant.

Applications, with copies of testimonials, including 1 from medical school, to be sent immediately to the Group Secretary, Epping Group Hospital Management Committee, "Oak Cottage," The Plain, Epping, Essex.

EPPING. ST. MARGARET'S HOSPITAL. Senior House OFFICER (chest diseases and casualty) required for busy General Hospital (421 Beds). Duties to include supervision of 40 Tuberculosis Beds and a proportion of relief casualty duty. Good experience in modern methods of treatment.

Applications, with copies of 2 recent testimonials, to be sent to the Group Secretary, Epping Group Hospital Management Committee, "Oak Cottage," The Plain, Epping, Essex, by 10th July, 1957.

EPPING. ST. MARGARET'S HOSPITAL. Senior House OFFICER (anæsthetics) required, resident. Busy General Hospital (421 Beds), easy access to London. Good experience. Application being made for recognition for D.A.

Applications, with copies of recent testimonials, to be sent to the Group Secretary, Epping Group Hospital Management Committee, "Oak Cottage," The Plain, Epping, Essex, by 17th July.

EPSOM, SURREY. WEST PARK HOSPITAL (for all stages of nervous and mental disorders). WEST PARK HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of a REGISTRAR in Psychiatry at above Hospital. Candidates may be of either sex. Single residential quarters available. All modern methods are practised and there are facilities for study for the D.P.M. Within easy reach of London.

Application forms obtainable from the Group Secretary to the West Park Hospital Management Committee, Epsom, Surrey, to whom they should be returned not later than 20th July, 1957.

ENFIELD, MIDDLESEX. CHASE FARM HOSPITAL. RESIDENT HOUSE SURGEON (approved pre-registration, first or second post), vacant 16th August, 1957. Duties with General Surgical Unit. Recognised by Royal College of Surgeons. 6 months appointment.

Applications, with the names and addresses of 2 referees, to Group Secretary, Enfield Group Hospital Management Committee, Chase Farm Hospital.

EXETER. ROYAL DEVON AND EXETER HOSPITAL. Applications are invited from pre-registration and registered medical practitioners for the appointments of HOUSE PHYSICIAN (2), vacant 10th August, 1957, and 25th August, 1957.

Applications, with copies of 2 recent testimonials, to the Hospital Secretary by 13th July, 1957.

GATESHEAD AND DISTRICT HOSPITAL MANAGE-MENT COMMITTEE. The post of CASUALTY SENIOR HOUSE OFFICER is vacant in the Gateshead Group of hospitals. Married accommodation may be available to suitable applicants.

Applications should be addressed direct to the Medical Superintendent, Queen Elizabeth Hospital, Gateshead, 9, co. Durham.

H. CLARK, Group Secretary.

GLASGOW ROYAL INFIRMARY AND ASSOCIATED HOSPITALS BOARD OF MANAGEMENT. SENIOR HOUSE OFFICER in General Medicine/Infectious Diseases. Duties at Belvidere Infectious Diseases Hospital in the first instance.

Write, giving 3 names for reference, not later than 20th July, 1957, to the Secretary, Board of Management for Glasgow Royal Infirmary and Associated Hospitals, 135, Buchanan-street, Glasgow, C.1.

GLASGOW ROYAL INFIRMARY. Junior Hospital MEDICAL OFFICER in Orthopædics. Duties at above Infirmary.

Write, giving 3 names for reference, not later than 27th July, 1957, to the Secretary, Board of Management for Glasgow Royal Infirmary and Associated Hospitals, 135, Buchanan-street, Glasgow, C.1.

GLASGOW, N.W. RUCHILL HOSPITAL. Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER in the Chest Department (Medical Unit). The department consists of 200 Beds for the treatment of pulmonary tuberculosis and other diseases of the chest. There is attached to the department a Thoracic Surgical Unit of 60 Beds. Facilities are available for postgraduate study and research.

Applications, stating age, qualifications and experience, along with names of 2 referees, to Physician-Superintendent, not later than 15th July.

GRANTHAM AND KESTEVEN GENERAL HOSPITAL. (118 Beds.) RESIDENT HOUSE PHYSICIAN (Senior House Officer or pre-registration Intern). General medical and pædiatric. Post vacant 1st August, 1957.

Applications, with full details and names of 2 referees, to Secretary, 101, Manthorpe-road, Grantham.

GUILDFORD. ROYAL SURREY COUNTY HOSPITAL. RESIDENT HOUSE SURGEON for Orthopædic and Traumatic Unit. The post, which is now vacant, is tenable for 6 months. It is open to pre-registration candidates and recognised for the F.R.C.S. examination. The post affords good experience in traumatic surgery.

Applications, with copies of 3 testimonials, should be sent to the Hospital Secretary.

HALIFAX. NORTHOWRAM HALL HOSPITAL. (108 Beds.) SENIOR HOUSE OFFICER in Chest Diseases required. Post vacant 1st August, 1957. Duties include attendance at busy chest clinic at the Royal Halifax Infirmary and non-tuberculous chest ward work. This post offers excellent facilities for the study of chest diseases, and experience is available with bronchoscopies and bronchograms. Salary £819 10s. p.a., with deduction of £150 p.a. for board, residence, &c.

Applications to be forwarded to the Group Secretary, Royal Halifax Infirmary, Halifax.

HITCHIN HOSPITALS, Hitchin, Hertfordshire. Surgical REGISTRAR required 1st September, 1957, at above hospitals, for 1 year in first instance. The post provides valuable all-round surgical experience and is recognised for F.R.C.S. The Hospitals may be visited by direct appointment (Hitchin 3701).

Application forms obtainable from Secretary, Luton and Hitchin Group Hospital Management Committee, St. Mary's Hospital, Luton, Beds, and returnable by 15th July, 1957.

HITCHIN HOSPITALS, Hitchin, Hertfordshire. Resident ANÆSTHETIST (Senior House Officer) required 1st August, 1957. Recognised for D.A. and F.F.A.R.C.S. examinations.

Applications, stating age, nationality, qualifications, and experience, together with names of 2 referees, to the Medical Administrator, Lister Hospital, Hitchin, as soon as possible.

HAROLD WOOD HOSPITAL, Harold Wood, Essex (near London). (415 Beds.) SENIOR HOUSE OFFICER (anæsthetics), resident. Main general and casualty hospital in Group. Recognised for D.A. and F.F.A.R.C.S.

Apply, giving full details, to the Hospital Secretary (Tel. : Ingrebourne 2881).

HEMEL HEMPSTEAD, HERTFORDSHIRE. WEST HERTS HOSPITAL. HOUSE SURGEON (pre-registration) required.

Applications, giving full details and copies of recent testimonials, should be sent to the Hospital Secretary at once.

HUDDERSFIELD. MILL HILL HOSPITAL. (132 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT MEDICAL OFFICER (Junior Hospital Medical Officer grade—£775–£50–£1075 p.a.), at the above Hospital. The present allocation of beds is 28 for infectious diseases and 104 for geriatric patients.

Applications, together with copies of 3 recent testimonials, to be addressed to the undersigned as soon as possible.

H. J. JOHNSON, Group Secretary,
Huddersfield Hospital Management Committee.

The Royal Infirmary, Huddersfield.

HUDDERSFIELD ROYAL INFIRMARY. (285 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON required, to commence duty immediately. The post is recognised as a pre-registration appointment and for the F.R.C.S. Salary in accordance with national scale.

Applications, together with copies of 3 recent testimonials, to be addressed to the undersigned as soon as possible.

H. J. JOHNSON, Secretary to the Management Committee.

The Royal Infirmary, Huddersfield.

HUDDERSFIELD (near). STORTHES HALL HOSPITAL, KIRKBURTON, near HUDDERSFIELD. Applications are invited for the post of Locum Tenens JUNIOR HOSPITAL MEDICAL OFFICER from 1st August, 1957 (long or short period). Residential accommodation available.

Applications, giving age, experience, &c., to be sent to the Medical Superintendent immediately.

HUNTINGDON COUNTY HOSPITAL. Applications are invited for the post of HOUSE OFFICER (medical). Post recognised for pre-registration purposes. The selected candidate will be required to look after medical and pædiatric cases and may be called upon to give emergency anæsthetics. Post vacant end July.

Apply, with full particulars and names of 2 referees, to Secretary, County Hospital, Huntingdon.

HUNTINGDON COUNTY HOSPITAL. Applications are invited for the post of HOUSE OFFICER (surgical), vacant now. Post recognised for pre-registration purposes.

Apply, with full particulars and names of 2 referees, to Secretary, County Hospital, Huntingdon.

IPSWICH AND EAST SUFFOLK HOSPITAL. Anglesea ROAD WING. (356 Beds.) Applications are invited for the post of HOUSE SURGEON to the Fracture and Orthopædic Department. Approved pre-registration post.

Applications, with copies of recent testimonials, to the Hospital Secretary.

IPSWICH AND EAST SUFFOLK HOSPITAL. Anglesea ROAD WING. (356 Beds.) Applications are invited for the post of HOUSE SURGEON to the Senior Consultant General Surgeon. The post is recognised for pre-registration and for the F.R.C.S. examinations.

Applications, with copies of recent testimonials, to Hospital Secretary.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. Senior HOUSE OFFICER (resident), E.N.T. Department. Post offers good experience. 3 to 4 operating sessions per week. Previous E.N.T. experience desirable but not essential.

Applications, stating age, nationality, qualifications and experience, with copies of up to 3 testimonials, to Group Secretary, South West Middlesex Hospital Management Committee, West Middlesex Hospital, Isleworth, by 15th July.

KETTERING AND DISTRICT GENERAL HOSPITAL. Applications are invited for the post of HOUSE SURGEON (pre-registration). Post recognised for F.R.C.S.

Applications, stating age, experience and qualifications, together with copies of 3 recent testimonials, to be sent to the Group Secretary, General Hospital, Kettering.

KIDDERMINSTER AND DISTRICT GENERAL HOSPITAL, WORCESTERSHIRE. (112 Beds.) Applications are invited for the pre-registration post of HOUSE OFFICER (House Surgeon) at the above Hospital. Post vacant now.

Applications, with the names of 3 referees, to the Hospital Secretary.

KIRKCALDY GENERAL HOSPITAL. House Officers required to commence duty at 1st August and 1st October, 1957. The Hospital has 74 general surgical and orthopædic beds and a busy Casualty and Outpatient Department. The posts qualify for pre-registration. Salary in accordance with national scale.

Apply, with copies of 2 recent testimonials, to the Medical Superintendent, East Fife Hospitals Board of Management, 243A, High-street, Kirkcaldy.

KIRKCALDY. VICTORIA HOSPITAL. 3 Pre-registration HOUSE OFFICER posts will become vacant at Victoria Hospital, Kirkcaldy, as at 1st October, 1957, 2 in the Acute Medical Unit (65 Beds) under the charge of a Consultant Physician and 1 part-time in the Acute Medical Unit and part-time in the Acute Geriatric Unit (48 Beds).

Apply, giving names of 2 referees, to the Medical Superintendent, East Fife Hospitals Board of Management, 243A, High-street, Kirkcaldy.

LANCASTER AND KENDAL HOSPITAL MANAGEMENT COMMITTEE. Whole-time REGISTRAR (pathology), non-resident. Main duties at Central Laboratory, Royal Lancaster Infirmary. Appointment for 1 year in the first instance; recognised for D.Path.

Applications, stating age, qualifications and previous experience, together with names of 3 referees, to Group Secretary, Lancaster and Kendal Hospital Management Committee, Royal Lancaster Infirmary, Lancaster.

LANCASTER MOOR HOSPITAL, Lancaster. (Regional MENTAL HOSPITAL.) Applications invited for the post of RESIDENT JUNIOR HOSPITAL MEDICAL OFFICER (Male or Female). Unfurnished flat available for married applicants; furnished quarters for single persons. Hospital recognised for D.P.M. and facilities granted for attending neighbouring universities. All modern methods of investigation and treatment carried out. Hospital serving N. Lancashire and Lake District. Post for initial period of 4 years, but renewable if services satisfactory.

Apply Medical Superintendent.

LOWESTOFT AND NORTH SUFFOLK HOSPITAL, LOWESTOFT. (98 Beds.) HOUSE PHYSICIAN required at once. House Officer or Senior House Officer status. Post recognised for Pre-registration Service and the Hospital is regularly visited by Consultant staff from the Norfolk and Norwich Hospital. The applicants should be willing to give anæsthetics of a simple nature when required. Membership of a Medical Defence Society is a condition of appointment.

Applications, giving full details with names of 2 referees, to Hospital Secretary.

LEEDS REGIONAL HOSPITAL BOARD.

(1) SENIOR REGISTRAR in Dermatology at the Bradford Royal Infirmary (57 dermatological beds), large Outpatient Department, over 4000 new cases annually. Non-resident.

(2) SENIOR REGISTRAR in Ophthalmology. Hull A Group with additional duties as required in Hull B and East Riding Groups (34 eye beds, 5430 new and 19,305 total outpatients annually). Non-resident.

Applications, stating age, qualifications and details of present and previous appointments with dates, together with the names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 18th July.

LEEDS REGIONAL HOSPITAL BOARD. Short-term LOCUM TENENS appointments in the Registrar grade are constantly available at hospitals in the area of the Board, particularly in the specialties of anæsthetics, general medicine, general and orthopædic surgery, and psychiatry.

Interested practitioners, suitably experienced, should communicate with the Secretary, Joint Registrars Committee, Park-parade, Harrogate.

LEEDS REGIONAL HOSPITAL BOARD. Registrar vacancies.

Anæsthetics

(i) Halifax Group (approximately 340 Beds in the surgical specialties). Resident.

(ii) Hull A, Hull B and East Riding Groups. Recognised for the F.F.A.R.C.S. Duties may include Thoracic Anæsthesia. Non-resident. Vacant October.

General Medicine

(i) Bradford A Group. Duties mainly at the Bradford Royal Infirmary (110 general medical beds). Resident. Vacant October.

(ii) Huddersfield Group (60 general medical beds). Non-resident.

General Surgery

(i) Bradford (A) Group. Mainly at the Bradford Royal Infirmary (100 surgical beds). Recognised for F.R.C.S. Vacant October.

(ii) Pontefract and Castleford (100 Beds). May include some duties in the Casualty Department. Married accommodation available.

(iii) Wakefield A and B Groups. Duties mainly at the Clayton Hospital, Wakefield (69 surgical beds). Resident or non-resident; married accommodation available. May include some duties in the Casualty Department.

(iv) Victoria Hospital, Keighley (35 surgical beds). Recognised for F.R.C.S. May include some duties in the Casualty Department.

Infectious Diseases

Leeds Road Hospital, Bradford (160 infectious diseases beds). Resident.

Ophthalmology

Huddersfield Group (23 eye beds and 1500 new outpatients annually). Non-resident.

Orthopædic Surgery

Harrogate General Hospital (38 orthopædic beds). Non-resident.

Otolaryngology

Huddersfield and Halifax Groups (57 Beds). Non-resident. Successful candidate to reside in Huddersfield. Recognised for Fellowship and the D.L.O.

Psychiatry

St. James's Hospital, Leeds. Offers special opportunity for experience with neurotic and psychosomatic patients. Vacant October.

Applications, stating age, qualifications, and details of present and previous appointments, with dates, together with the names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 11th July, 1957.

LEEDS. THE UNITED LEEDS HOSPITALS. Applications are invited for the post of REGISTRAR in Pædiatrics at the General Infirmary at Leeds which will shortly become vacant. The appointment will be non-resident and will be for 1 year in the first instance.

Applications, giving age, full details of qualifications and previous posts with dates, together with the names of 3 referees, to be sent not later than 17th July, 1957, to the Sub-Dean, School of Medicine, Leeds, 2.

LEEDS. UNITED LEEDS HOSPITALS/LEEDS REGIONAL HOSPITAL BOARD. REGISTRAR in Thoracic Surgery. First year normally at the Regional Thoracic Centre, Pinderfields General Hospital, Wakefield (56 Beds), which is under the charge of the Consultants to the Teaching Hospital. Second year if possible at the General Infirmary at Leeds. Recognised for F.R.C.S.

Applications, stating age, qualifications and details of present and previous appointments with dates, together with the names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 18th July, 1957.

LEICESTER ROYAL INFIRMARY. Sheffield Regional HOSPITAL BOARD. Whole-time NON-RESIDENT SENIOR HOUSE OFFICER or REGISTRAR in Radiotherapy required 1st September. Possession of a higher qualification in medicine or surgery or the D.M.R.(T) Part I would qualify for appointment of Registrar. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 15th July, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

LEICESTER ISOLATION HOSPITAL AND CHEST UNIT. (328 Beds. Recognised for training for F.R.C.S.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (thoracic surgery) required. Active Thoracic Surgical Centre undertaking all kinds of thoracic work including cardiac surgery. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 15th July, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

LINCOLN COUNTY HOSPITAL, Sewell-road, Lincoln. Applications are invited for the post of SENIOR HOUSE OFFICER in Surgery for the 6 months commencing 20th July, 1957.

Applications to— R. W. HOWICK, Secretary,
Lincoln No. 1 Hospital Management Committee.

LINCOLN COUNTY HOSPITAL. (200 Beds.) Applications are invited from pre-registration candidates for appointment as HOUSE SURGEON for 6 months to be followed if satisfactory by appointment as House Physician for a further 6 months.

Full particulars should be sent to—
R. W. HOWICK, Group Secretary.

LINCOLN COUNTY HOSPITAL. (200 Beds.) Applications are invited from pre-registration candidates for appointment as HOUSE PHYSICIAN for a period of 6 months.

Full particulars should be sent to—
R. W. HOWICK, Secretary.

LIVERPOOL, 20. BOOTLE HOSPITAL. Applications are invited for a post as HOUSE SURGEON. The post will be vacant from 14th July, 1957, and is recognised for Pre-registration Service.

Apply to Secretary, Walton Hospital, Liverpool, 9.

LOUTH, LINCOLNSHIRE. COUNTY HOSPITAL. (215 Beds.) GRIMSBY HOSPITAL MANAGEMENT COMMITTEE. HOUSE OFFICER (surgical). Applications are invited for this pre-registration post which falls vacant 31st August next.

Applications, giving full details, together with the names of 2 referees, should be addressed to the Hospital Secretary.

LUTON AND DUNSTABLE HOSPITAL, Luton, Bedfordshire. 2 HOUSE SURGEONS for Casualty and Orthopædic Service, required immediately. Recognised as pre-registration posts and for F.R.C.S. and tenable for 6 months.

Applications, stating age, nationality, qualifications, and experience, together with copies of 3 recent testimonials, to the Secretary of the Hospital as soon as possible.

MEDICAL RESEARCH COUNCIL. Applications are invited for the appointment of SENIOR HOUSE OFFICER at Pneumoconiosis Research Unit, Llandough Hospital, near Penarth, Glam, to commence duty August/September.

Apply in writing to the Director at the above address.

MACCLESFIELD. PARKSIDE MENTAL HOSPITAL. (1650 Beds.) Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER (psychiatric). Accommodation available for a single person. The appointment in the first place will be for a period of 4 years but reapplication may be made by the successful applicant at the end of this period. Facilities for attending the course for the D.P.M. at Manchester University will be granted and the Hospital is recognised by the Conjoint Board for the purposes of the D.P.M. The Hospital may be visited by appointment.

Applications, with the names of 2 referees, to be sent to the Medical Superintendent, Parkside Hospital, Macclesfield Cheshire, by 20th July, 1957.

MACCLESFIELD. PARKSIDE HOSPITAL MANAGEMENT COMMITTEE. (1650 Beds.) Applications are invited for the post of RESIDENT REGISTRAR in Psychiatry. Facilities for attending the course for the D.P.M. at Manchester University will be granted and the Hospital is recognised by the Conjoint Board for the purpose of the D.P.M. The Hospital may be visited by appointment.

Applications, with the names of 2 referees, to be sent to the Medical Superintendent, Parkside Hospital, Macclesfield, Cheshire, by 20th July, 1957.

MANCHESTER. CRUMPSALL HOSPITAL. Applications are invited for the post of REGISTRAR (or SENIOR HOUSE OFFICER) in the Department of Neurosurgery at the above Hospital. Vacant 28th August, 1957. A new Department, of over 20 Beds, for adult cases is being started and will become a self-contained unit. Facilities will be made available for the successful applicant to gain experience in psychosurgery at neighbouring hospitals, and, if desired, pædiatric surgery.

Applications, with names of 2 referees, by 22nd July, 1957, to Group Secretary, North Manchester Hospital Management Committee, Crumpsall Hospital, Manchester.

MANCHESTER, 4. ANCOATS HOSPITAL. Applications are invited for the resident post of SENIOR HOUSE OFFICER in Surgery. Recognised for F.R.C.S. Vacant 1st September, 1957.

Applications, with names of 2 referees, by 15th July, 1957, to Group Secretary, North Manchester Hospital Management Committee, Crumpsall Hospital, Manchester.

MANCHESTER. BOOTH HALL CHILDREN'S HOSPITAL, BLACKLEY, MANCHESTER, 9. RESIDENT SURGICAL OFFICER (Registrar) required. Post vacant. 3-roomed furnished flat available if required. Hospital is part of University Department of Child Health, carries out undergraduate teaching, and is recognised for D.C.H. 160 active surgical beds including all branches except thoracic surgery. Patients admitted from birth to 16 years.

Applications to Group Secretary, together with names of 2 referees, as soon as possible.

MANCHESTER, 19. DUCHESS OF YORK HOSPITAL FOR BABIES. SOUTH MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER required for 12 months. Post is senior of 3. D.C.H. or M.R.C.P. an advantage but not essential. The Hospital is associated with the University Department of Child Health for teaching purposes.

Applications, with full details together with the names of 2 referees, to the Group Secretary, Withington Hospital, Manchester.

MANCHESTER, 20. WITHINGTON HOSPITAL. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (surgical) for 1 year including 4 months casualty duties. The post is recognised for F.R.C.S., and possession of the primary F.R.C.S. will be an advantage. The Hospital is recognised by the Manchester University for the teaching of undergraduate students.

Applications, with full details, to the Group Secretary, Withington Hospital, immediately.

MANCHESTER, 23. WYTHENSHAWE HOSPITAL. SOUTH MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of CASUALTY OFFICER (Senior House Officer grade) at the above-named Hospital. This post is recognised by the Royal College of Surgeons.

Applications, stating age, qualifications, present post, experience, and names of 2 referees, to be forwarded to the Group Secretary, Withington Hospital, within 7 days of the appearance of this advertisement.

MANCHESTER REGIONAL HOSPITAL BOARD. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. The Board invite applications from registered practitioners for the post of RESIDENT SURGICAL OFFICER (Registrar grade) at Withington Hospital. The Resident Surgical Officer is appointed to 1 or more surgical firms and is responsible for surgical urgencies as part of his duties. Candidates must hold the F.R.C.S.

Applications, with full details, to be forwarded to the Group Secretary, Withington Hospital, Manchester, 20, immediately.

MANCHESTER REGIONAL HOSPITAL BOARD. Salford HOSPITAL MANAGEMENT COMMITTEE. HOPE HOSPITAL. RESIDENT SURGICAL REGISTRAR required at the above Hospital. Previous experience in surgery essential and Diploma of F.R.C.S. desirable.

Applications, together with names of 2 referees, to be sent to Group Secretary, Salford Royal Hospital, Salford, 3, before 13th July, 1957.

MANCHESTER REGIONAL HOSPITAL BOARD invites applications for post of RESIDENT SURGICAL REGISTRAR to Macclesfield District Group hospitals, main duties Infirmary Branch, Macclesfield Hospital. Hospital recognised for F.R.C.S. regulations.

Apply immediately, with names and addresses of 2 referees, to Group Secretary, "Willerby House," Cumberland-street, Macclesfield.

MANCHESTER REGIONAL HOSPITAL BOARD. Bury AND ROSSENDALE, AND ROCHDALE AND DISTRICT HOSPITAL MANAGEMENT COMMITTEES. Applications are invited for the post of REGISTRAR in Pædiatrics which is now vacant. The successful applicant, who may be either resident or non-resident, will have duties in the Neonatal Departments and Children's Units at hospitals in the above Groups, which are recognised for the D.C.H. The person appointed to the post will supervise the work of Senior House Officers in both Groups and assist the Consultant Pædiatrician.

Apply, stating full details of experience and qualifications, together with names of 2 referees, to—
H. WILKINSON, Group Secretary.
Bury General Hospital, Bury, Lancs.

MANCHESTER REGIONAL HOSPITAL BOARD invite applications for the post of REGISTRAR in Thoracic Surgery to the Blackpool and Fylde Group of hospitals with main duties at the Victoria Hospital, Blackpool. The post available from early October is recognised for the F.R.C.S. and offers a sound experience gained with the 2 Consultant Thoracic Surgeons who are responsible for the thoracic surgery in the Northern part of the Manchester Region. Non-resident post but residential accommodation is available, if required, for single applicants.

Applications, stating age, qualifications and experience together with the names and addresses of 2 referees, should be sent to the Group Secretary, Victoria Hospital, Blackpool.

MANCHESTER REGIONAL HOSPITAL BOARD. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of RESIDENT SURGICAL OFFICER (Registrar grade) at Wythenshawe Hospital. The post will include responsibility for general surgical and gynæcological beds, and is recognised by the Royal College of Surgeons.

Applications, stating age, qualifications, present post, experience and names of 2 referees, to the Group Secretary, Withington Hospital, Manchester, 20.

MANCHESTER REGIONAL HOSPITAL BOARD. Salford Hospital Management Committee. REGISTRAR in Neurosurgery required with duties at Salford Royal Hospital and the Royal Manchester Children's Hospital. Resident or non-resident.

Applications, with names of 2 referees, to Group Secretary, Salford Royal Hospital, Salford, 3, before 13th July, 1957.

MANCHESTER. UNITED MANCHESTER HOSPITALS and Manchester Regional Hospital Board. SENIOR REGISTRAR in Surgery, to commence as soon as possible. Whole-time non-resident appointment for 12 months, renewable, commencing at the Manchester Royal Infirmary in the Surgical Professorial Unit. Applicants must possess a higher qualification. Arrangements may eventually be made for the successful candidate to transfer to 1 of the Manchester Regional Hospitals to continue training.

Application form obtainable from the undersigned, to be returned by 20th July, 1957.

F. J. CABLE, Secretary to the Board of Governors.
United Manchester Hospitals, Manchester Royal Infirmary, Manchester, 13.

MANCHESTER. UNITED MANCHESTER HOSPITALS. Saint Mary's Hospitals. FIRST ASSISTANT (Registrar grade). There will very shortly be a second vacancy in this grade and applications are invited from suitable candidates (salary at national scale). There is an establishment of 4 "First Assistants"—2 of Senior Registrar grade and 2 of Registrar grade. Initially the appointment will be for 1 year, renewable normally for a second year. The post is non-resident. The duties include very considerable clinical responsibility for obstetrical and gynæcological cases, including cases dealt with in the "Flying-squad" service. The supervision of House Officers and some teaching of undergraduate medical students are also involved. Candidates must therefore have had full previous experience in obstetrics and gynæcology. A higher qualification is desirable.

Forms of application may be obtained from the undersigned. The closing date is 16th July, 1957.

A. R. WISE, General Superintendent.
Saint Mary's Hospitals, Whitworth Park, Manchester, 13.

MIDDLESBROUGH (near). HEMLINGTON HOSPITAL. Tees-side Hospital Management Committee. Applications are invited for the appointment of SENIOR HOUSE OFFICER (medical) at the above-named Hospital, which appointment becomes vacant on 1st September, 1957. The Hospital is situated in the country within easy reach of Middlesbrough and good transport arrangements are available. The Medical Unit consists of 60 Beds, 40 of which are acute.

Applications, stating full details and giving names of 2 referees, should be addressed to the Hospital Secretary.

MIDDLESBROUGH. GENERAL HOSPITAL, Ayresome Green-lane. (309 Beds.) Tees-side Hospital Management Committee. Applications are invited for the appointment of SENIOR HOUSE OFFICER (casualty) at the above Hospital. The appointment offers excellent experience in a very busy department, for which there is a whole-time Senior Casualty Officer and 2 whole-time Senior House Officers.

Applications, stating full details and giving names of 2 referees, should be sent, as soon as possible, to the Hospital Secretary.

MIDDLESBROUGH. GENERAL HOSPITAL, Ayresome Green-lane. (309 Beds.) Tees-side Hospital Management Committee. Applications are invited for the appointment of SENIOR HOUSE OFFICER (orthopædics). The appointment is recognised for the F.R.C.S. examination and will include some duties in the Casualty Department, which is under the supervision of a full-time Senior Casualty Officer.

Applications, stating age, qualifications and experience, together with the names of 2 referees, should be sent, as soon as possible to the Hospital Secretary.

MIDDLESBROUGH. NORTH ORMESBY HOSPITAL. (180 Beds.) Tees-side Hospital Management Committee. Applications are invited for the appointment of HOUSE OFFICER (surgery) at the above-named Hospital. The appointment, which is recognised for Pre-registration Service under the Medical Act, 1950, vacant now.

Applications, stating full details and giving 2 names for reference, should be addressed, immediately, to the Hospital Secretary.

MAIDSTONE. PRESTON HALL HOSPITAL, British Legion Village, Maidstone, Kent. Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER at the above Hospital, which contains 330 Beds for treatment of pulmonary tuberculosis and other chest diseases and includes a major Thoracic Surgical Unit. Candidates should have had experience in general medicine and in the treatment of pulmonary tuberculosis in adults. Salary £852 10s.–£55–£1182 10s. p.a., national scale and conditions.

Applications, stating age, qualifications, and experience with relevant dates, together with names and addresses of 2 referees, to be sent to the Group Secretary by 27th July, 1957.

MAIDSTONE. WEST KENT GENERAL HOSPITAL. (141 Beds.) Mid-Kent Hospital Management Committee. CASUALTY OFFICER (Senior House Officer). Recognised for F.R.C.S. Salary £819 10s. a year, less £150 a year for board and lodging. Post vacant now.

Applications to the Administrative Officer at the Hospital.

MAIDSTONE. KENT COUNTY OPHTHALMIC AND Aural Hospital. (113 Beds.) Mid-Kent Hospital Management Committee. Applications are invited for the appointment of SENIOR HOUSE SURGEON in the E.N.T. Department of the above Hospital. Post vacant 1st August, 1957. There are 55 E.N.T. beds and 6 specialist operating sessions each week. Valuable experience is available, and the post is recognised for the purpose of the F.R.C.S. and the D.L.O. Salary will be £819 10s. a year, less £150 a year for residential emoluments.

Applications to the Administrative Officer, Kent County Ophthalmic and Aural Hospital, Maidstone, Kent.

MAIDSTONE. KENT COUNTY OPHTHALMIC AND Aural Hospital. (113 Beds.) Mid-Kent Hospital Management Committee. Applications are invited for the appointment of SENIOR HOUSE SURGEON in the Ophthalmic Department of the above Hospital. Post vacant 17th August, 1957. The Hospital is recognised by the Examining Board for the F.R.C.S. and the D.O. Salary £819 10s. a year, less £150 a year for residential emoluments.

Applications should be forwarded, as soon as possible, to the Administrative Officer, Kent County Ophthalmic and Aural Hospital, Church-street, Maidstone.

NEWCASTLE GENERAL HOSPITAL. (844 Beds.) SENIOR HOUSE OFFICER (Department of Urology—51 Beds). The Department is the Regional Urological Centre. Post offers excellent opportunities for obtaining practical experience in urology, and is recognised for the F.R.C.S. (Eng.).

Applications, together with names of 2 referees, should be addressed to the Secretary, Newcastle General Hospital, Newcastle upon Tyne, 4.

NEWCASTLE REGIONAL HOSPITAL BOARD. Senior REGISTRAR ANÆSTHETIST (whole-time), Newcastle Group of hospitals—main hospital Newcastle General (838 Beds, including Special Units, i.e., Neurosurgical, Plastic Surgery, &c.). Married or single accommodation available.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, within 7 days.

NEWCASTLE REGIONAL HOSPITAL BOARD. 2 PÆDIATRIC REGISTRARS to work in the Newcastle upon Tyne Group of hospitals, and in the United Newcastle Hospitals. These posts are circulating designed to give experience in various branches of pædiatrics, and the hospitals involved include the Newcastle General, Hospital for Sick Children, Walker Gate Hospital, Royal Victoria Infirmary and the Princess Mary Maternity Hospital. One of the appointees will begin in the Maternity Department, Newcastle General Hospital, and the other in the Children's Wards, Royal Victoria Infirmary. Posts include teaching duties.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, within 14 days.

NEWCASTLE. THE UNITED NEWCASTLE UPON Tyne Hospitals. Applications are invited for the resident appointment of SENIOR HOUSE OFFICER to the Department of Obstetrics and Gynæcology. The successful candidate will have duties in the Royal Victoria Infirmary and the Princess Mary Maternity Hospital. The appointment is for 1 year and will be subject to the terms and conditions of service of hospital medical staff in the National Health Service. The salary will be at the rate of £819 10s. p.a., subject to the appropriate deductions.

Applications, giving full details and the names and addresses of 3 referees, should be sent to the undersigned within 2 weeks of the appearance of this advertisement.

A. W. SANDERSON, House Governor and Secretary.
Royal Victoria Infirmary, Newcastle upon Tyne.

NEWCASTLE. THE UNITED NEWCASTLE UPON Tyne Hospitals. Applications are invited for the non-resident appointment of REGISTRAR in the Children's Department of the Royal Victoria Infirmary. The appointment will be for 1 year in the first instance and will be subject to the terms and conditions of service of hospital medical staff in the National Health Service. In the first instance the successful candidate will work in the children's wards of the Royal Victoria Infirmary, and it is possible that arrangements may be made for experience to be obtained in other children's hospitals in the Newcastle area later.

Applications, giving full details and the names and addresses of 3 referees, should be sent to the undersigned within 2 weeks of the appearance of this advertisement.

A. W. SANDERSON, House Governor and Secretary.
Royal Victoria Infirmary, Newcastle upon Tyne.

NEWCASTLE. THE UNITED NEWCASTLE UPON Tyne Hospitals. Applications are invited for the non-resident appointment of SENIOR HOUSE OFFICER in the Department of Neurology and Neurosurgery at the Royal Victoria Infirmary. The appointment will be for 1 year and will be subject to the terms and conditions of service of hospital medical staff in the National Health Service.

Applications, giving full details and the names and addresses of 3 referees, should be sent to the undersigned by 17th July, 1957.

A. W. SANDERSON, House Governor and Secretary.
Royal Victoria Infirmary, Newcastle upon Tyne.

NEWCASTLE. THE UNITED NEWCASTLE UPON Tyne Hospitals. Applications are invited for the whole-time non-resident appointment of REGISTRAR in the Orthopædic Department at the Royal Victoria Infirmary. The successful candidate will be required to teach in his subject and preference will be given to applicants who have passed the Primary Fellowship examination. The appointment is for 1 year in the first instance and will be subject to the terms and conditions of service of hospital medical staff in the National Health Service.

Applications, giving full details, with the names and addresses of 3 referees, should be sent to the undersigned within 2 weeks of the appearance of this advertisement.

A. W. SANDERSON, House Governor and Secretary.
Royal Victoria Infirmary, Newcastle upon Tyne.

NOTTINGHAM GENERAL HOSPITAL. Resident pre-registration or registered HOUSE SURGEONS required immediately, and 31st July.

Applications, stating age, qualifications and nationality, together with copies of testimonials, to be sent to the Group Secretary.

NOTTINGHAM GENERAL HOSPITAL. Resident Pre-registration HOUSE PHYSICIANS required 31st July.

Applications, stating age, qualifications and nationality, together with copies of testimonials, to be sent to the Group Secretary.

NOTTINGHAM. HIGHBURY HOSPITAL, Bulwell, NOTTINGHAM. SENIOR HOUSE OFFICER (medical), required. The successful candidate will, in addition to medical duties, have an opportunity of assisting in the Obstetric Unit. This post will be accepted as a general medical appointment entry to the M.R.C.O.G. examination.

Apply in writing, stating age, qualifications and experience, together with copies of testimonials, to the Hospital Secretary.

NORTHWOOD, MIDDLESEX. MOUNT VERNON HOSPITAL. Applications invited for Whole-time SURGICAL REGISTRAR, required for 1 year in the first instance. Appointment recognised for the Final F.R.C.S. examination. Candidates may visit the Hospital by direct appointment with the Resident Medical Officer.

Application forms obtainable from, and returnable to, the Group Secretary, Harefield and Northwood Group Hospital Management Committee, Mount Vernon Hospital, Northwood, Middlesex, by 20th July, 1957.

NEWMARKET GENERAL HOSPITAL. Applications are invited for the post of HOUSE SURGEON, vacant 27th July, 1957. Duties include surgical house charge of general surgical and some eye cases. Post resident and available for 6 months, recognised for pre-registration.

Applications, with copies of 3 testimonials, to the Medical Superintendent.

OXFORD REGIONAL HOSPITAL BOARD. Locum RADIOLOGIST, 15th July–17th August and/or 26th August–14th September, 1957, at Northampton General Hospital.

Applications, stating qualifications, experience and names of 2 referees, to Secretary, 43, Banbury-road, Oxford.

OXFORD REGIONAL HOSPITAL BOARD. Registrar in General Medicine to the hospitals of the Aylesbury Area. The appointment will be for 1 year and eligible for extension to 2 years.

Applications, on forms obtainable from the Secretary, Registrar Committee, 43, Banbury-road, Oxford, should reach him by 27th July, 1957.

OXFORD REGIONAL HOSPITAL BOARD. Registrar in General Surgery to the hospitals of Aylesbury and High Wycombe Hospital Management Committees, with duties mainly at Stoke Mandeville and Amersham Hospitals. Resident or non-resident. Post recognised for the F.R.C.S. The appointment will be for 1 year and eligible for extension to a second year.

Applications, on forms obtainable from the Secretary, Registrar Committee, 43, Banbury-road, Oxford, should reach him 15th July.

OXFORD. UNITED OXFORD HOSPITALS. The Radcliffe INFIRMARY. Applications are invited for the post of REGISTRAR/RESEARCH ASSISTANT to the Accident Service from 1st September, 1957. The duties of this post will be divided equally between the clinical duties of the Registrar appointment, and research work in the department, under the supervision of the Director of the Accident Service.

Applications, on forms obtainable from the Administrator, Radcliffe Infirmary, Oxford, should be received not later than 22nd July, 1957.

PERTH. COUNTY AND CITY OF PERTH GENERAL HOSPITALS. The following posts will fall vacant on 1st August, 1957.

SENIOR HOUSE SURGEON (Fracture and Orthopædic Unit), Bridge of Earn Hospital.

SENIOR HOUSE SURGEON (General Surgical Unit), Bridge of Earn Hospital.

HOUSE SURGEON or SENIOR HOUSE SURGEON (Casualty Department), Perth Royal Infirmary (grade according to experience).

All posts recognised by the Royal College of Surgeons under regulations for the F.R.C.S. Post in junior grade recognised for Pre-registration Hospital Service.

Applications, giving age, qualifications, experience, and names of 2 referees, should be sent to the Group Medical Superintendent, Perth Royal Infirmary, Perth.

POOLE GENERAL HOSPITAL, Longfleet-road, Poole, DORSET. BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Locum SENIOR SURGICAL REGISTRAR required immediately until 15th August.

Applications to the Hospital Secretary.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE.

Queen Alexandra Hospital (87 surgical beds)

SENIOR HOUSE OFFICER (general medicine and dermatology), vacant 22nd July, 1957.

HOUSE SURGEON (pre-registration), vacant now.

HOUSE PHYSICIAN (78 medical beds) (pre-registration), vacant 30th July, 1957.

Saint Mary's Hospital (130 surgical beds).

HOUSE SURGEONS (pre-registration), vacant 30th July, 1957, and 1st August, 1957.

HOUSE PHYSICIANS (74 medical beds) (pre-registration), vacant 30th July, 1957 (1), and 31st July, 1957 (2).

Royal Portsmouth Hospital (61 medical beds)

HOUSE PHYSICIAN (pre-registration), vacant now.

Applications, stating age, experience, and qualifications, together with the names of 2 referees, should be forwarded as soon as possible to E. H. HURST.

Saint Mary's Hospital, Milton-road, Portsmouth.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post of RESIDENT SURGICAL OFFICER (Registrar grade) with duties mainly at the Royal Portsmouth Hospital. Vacant 16th September, 1957. Recognised for the F.R.C.S.

Forms of application may be obtained from the Group Secretary, St. Mary's Hospital, Portsmouth, which should be returned to him duly completed on or before 15th July, 1957. Candidates may visit the above Hospital by arrangement with the Group Secretary.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE. PORTSMOUTH GROUP OF HOSPITALS. ANÆSTHETIST (Senior House Officer grade). Main duties at the Royal Portsmouth Hospital. Recognised for the F.F.A.R.C.S. Vacant 1st August, 1957.

Applications, stating age, experience and qualifications, together with the names of 2 referees, should be forwarded as soon as possible to E. H. HURST.

Saint Mary's Hospital, Milton-road, Portsmouth.

PORTSMOUTH AND ISLE OF WIGHT AREA PATHOLOGICAL SERVICE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post of REGISTRAR in Pathology. The successful candidate will be expected to do a tour of duty in the Departments of Bacteriology, Hæmatology, Histology and Biochemistry at the Central Laboratory, and may also be required to work in any of the laboratories covered by the Service. The Laboratory is recognised for the Diploma of Pathology. Vacant 1st October, 1957.

Forms of application may be obtained from the Group Secretary, Portsmouth Group Hospital Management Committee, St. Mary's Hospital, Milton, Portsmouth, which should be returned to him duly completed on or before 15th July, 1957. Canvassing will disqualify. Candidates may visit the Central Laboratory, Milton-road, Portsmouth, by arrangement with the Senior Pathologist.

READING AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER for E.N.T. Department, Royal Berkshire Hospital, Reading (40 Beds). Post recognised for D.L.O.

Applications, stating age, nationality, experience and qualifications, together with names of 2 referees, should be sent to Group Secretary, 3, Craven-road, Reading.

READING AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT SENIOR HOUSE OFFICER (area Accident and Orthopædic Department), vacant immediately. Recognised for F.R.C.S. Duties including work in area Casualty Department at Battle Hospital, Reading (300 Beds). Person appointed will work with Registrar and House Officers.

Apply, stating nationality, present post, and qualifications with dates, together with names of 2 referees, to Group Secretary, 3, Craven-road, Reading.

READING. BATTLE HOSPITAL. (391 Beds.) Applications are invited from registered medical practitioners for the post of RESIDENT JUNIOR HOUSE SURGEON in the Accident and Orthopædic Department. Post vacant 1st August. F.R.C.S. recognised. Also casualty duties.

Apply, stating age, qualifications with dates, nationality, present post, with 1 copy of recent testimonial, to Hospital Secretary.

READING COMBINED HOSPITALS. Area Department OF OBSTETRICS AND GYNÆCOLOGY. (100 Beds.) Applications are invited from registered medical practitioners for the resident post of HOUSE SURGEON to the above Department. The appointment which is vacant immediately is for 1 year, with 6 months gynæcology at the Royal Berkshire Hospital, and 6 months in the Maternity Unit at Battle Hospital. Both appointments are recognised for the Diplomas of the Royal College of Obstetricians and Gynæcologists.

Write, stating age and qualifications with dates, nationality, and present post, with copy of 1 recent testimonial, to Secretary, Royal Berkshire Hospital, Reading.

REDHILL. EAST SURREY HOSPITAL, Shrewsbury-road, REDHILL, SURREY. SENIOR HOUSE OFFICER (Male), mainly surgical. Post vacant immediately.

Apply to the Hospital Secretary.

RYDE. ROYAL I.W. COUNTY HOSPITAL. Isle of Wight GROUP HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIAN required (pre-registration post), vacant 22nd July.

Applications, with names of 2 referees, to Hospital Secretary not later than 13th July.

RYDE. ROYAL I.W. COUNTY HOSPITAL. Isle of WIGHT GROUP HOSPITAL MANAGEMENT COMMITTEE. HOUSE OFFICER for Pre-registration Service (salary £467 10s.–£577 10s., according to experience) or SENIOR HOUSE OFFICER (salary £819 10s.) required as House Surgeon. Post recognised for F.R.C.S.

Applications, with names of 2 referees, to the Hospital Secretary by 19th July, 1957.

ROMFORD, ESSEX. OLDCHURCH HOSPITAL. (722 Beds.) RESIDENT HOUSE PHYSICIAN required from 24th July, 1957. Open to either pre-registration applicants or to fully qualified practitioners.

Apply immediately to Group Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital.

ROMFORD ESSEX. OLDCHURCH HOSPITAL. (722 Beds.) ORTHOPÆDIC HOUSE SURGEON (resident) required in the Orthopædic and Accident Unit immediately. The service consists of 100 beds equally divided between traumatic surgery and "cold" orthopædics. Post is recognised for pre-registration purposes and for F.R.C.S.

Applications to be sent to Group Secretary, Romford Hospital Management Committee, Oldchurch Hospital.

ROMFORD, ESSEX. VICTORIA HOSPITAL. (99 Beds.) RESIDENT HOUSE SURGEON (Male) required immediately. (Not pre-registration appointment.)

Applications should be forwarded to the Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford.

ROMFORD, ESSEX. RUSH GREEN HOSPITAL. (301 Beds.) RESIDENT HOUSE OFFICER (general surgery) required from 30th July, 1957. Post is recognised for pre-registration purposes and for F.R.C.S.

Applications should be forwarded immediately to Medical Superintendent, stating also names of 2 referees.

ROMFORD, ESSEX. RUSH GREEN HOSPITAL. (301 Beds.) GYNÆCOLOGICAL HOUSE SURGEON (Male or Female), required. Unit comprises 35 gynæcological and 6 maternity beds. Resident post open to either pre-registration applicants or to fully qualified practitioners.

Applications to Medical Superintendent as soon as possible. Hospital may be seen by arrangement (Tel. Romford 7711).

ROCHDALE AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (medicine), resident, required at Birch Hill Hospital late July.

Apply at once to Group Secretary, Central Offices, Birch Hill Hospital, Rochdale, Lancs.

ROCHDALE. BIRCH HILL HOSPITAL. Pædiatric SENIOR HOUSE OFFICER (resident) vacant early August. Recognised D.C.H.

Apply to Group Secretary, Central Offices, Birch Hill Hospital, Rochdale, Lancs, at once.

SALFORD. HOPE HOSPITAL. Salford Hospital Management Committee. Applications invited for post of RESIDENT SENIOR HOUSE OFFICER ANÆSTHETIST. In the theatre about 3000 operations are performed annually. 2 Consultant Anæsthetists are available. The Hospital is recognised for the D.A. and the F.F.A.R.C.S.

Applications also invited for posts of PÆDIATRIC SENIOR HOUSE OFFICER for a period of 12 months and PÆDIATRIC HOUSE OFFICER (post-registration), the latter post vacant on 27th July, 1957. Posts recognised for D.C.H. The department comprises 120 Beds, including medical and surgical wards, infant wards and Outpatients Department. The Pædiatric staff supervise the neonatal nurseries of the Obstetrical Department (approximately 70 lying-in beds).

Applications, with names and addresses of 3 referees, should be forwarded to Secretary, Hope Hospital, Salford, 6, Lancs, forthwith.

SALFORD ROYAL HOSPITAL. Salford Hospital Management Committee. Applications invited for the appointment of SENIOR HOUSE OFFICER (Orthopædic and Casualty Departments), resident. Recognised for F.R.C.S. Gives opportunity for emergency surgery.

Applications, with copies of 3 recent testimonials, to the Secretary, Salford Royal Hospital, Chapel-street, Salford, 3.

SCOTLAND. NORTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the post of REGISTRAR or SENIOR REGISTRAR in Dermatology at the Aberdeen Royal Infirmary. The appointment will be filled in either of these grades according to the experience and qualifications of the applicant. The post will include some duties in the Venereological Department.

Applications, giving the names of 2 referees, should be submitted by 19th July, 1957, to the Secretary, North-Eastern Regional Hospital Board, Scotland, 1, Albyn-place, Aberdeen, from whom further particulars may be obtained.

SCOTLAND. NORTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the post of SENIOR REGISTRAR in Anæsthetics on the staffs of the Aberdeen General Hospitals and the Aberdeen Special Hospitals. Candidates preferably should hold a higher qualification in anæsthetics.

Applications, together with the names of 2 referees, should be lodged by 25th July, 1957, with the Secretary, 1, Albyn-place, Aberdeen, from whom further particulars may be obtained.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR to the Royal Edinburgh Hospital for Mental and Nervous Disorders, for work in the first instance in the Professorial Unit at the Jordanburn Nerve Hospital. During the tenure of the post opportunities for study and interchange of duty and training at other centres in the Region may be available under the joint training scheme of the South-Eastern Regional Hospital Board and the Department of Psychological Medicine of the University of Edinburgh. Single accommodation available. The Hospital may be visited by arrangement with the Physician-Superintendent.

Apply, giving particulars of age, qualifications and previous experience, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 31st July, 1957.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR in Pathology at the Edinburgh Northern Group of hospitals, vacant on 1st October, 1957.

Apply, giving particulars of age, previous experience and qualifications, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh 3, by 31st July, 1957.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR in Surgery at the Royal Infirmary of Edinburgh, vacant on 1st October, 1957.

Apply, giving particulars of age, qualifications and previous experience, together with the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh 3, by 31st July, 1957.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. 2 appointments as REGISTRAR in Medicine at the Royal Infirmary of Edinburgh.

(*a*) For duties in a general medical charge, vacant on 1st October, 1957

(*b*) For duties in the Cardiological Unit, vacant on 9th October, 1957.

Apply, giving particulars of age, qualifications and previous experience, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 31st July, 1957.

SCOTLAND. EASTERN REGIONAL HOSPITAL BOARD. PERTH ROYAL INFIRMARY. Applications are invited for the appointment of REGISTRAR in Medicine at Perth Royal Infirmary (272 Beds). Salary and conditions of service in accordance with national agreement.

Further particulars and forms of application from the Secretary to the Board, "Braeknowe," 430, Blackness-road, Dundee, with whom applications must be lodged not later than 20th July, 1957.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the following appointments, which will be for 1 year in the first instance :—

SENIOR REGISTRAR in Radiodiagnosis based at the Royal Infirmary, Glasgow.

SENIOR REGISTRAR in Tuberculosis based at Robroyston Hospital, Glasgow.

REGISTRAR in E.N.T. Surgery based at Stobhill General Hospital, Glasgow.

2 REGISTRARS in Medicine based at the Royal Infirmary, Glasgow.

Applications (12 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, by 20th July, 1957.

SHEFFIELD. THE UNITED SHEFFIELD HOSPITALS. Applications invited for the following posts :—

Royal Infirmary

(*a*) NON-RESIDENT or RESIDENT CASUALTY REGISTRAR to the Orthopædic and Accident Department. Post vacant 26th August. Post recognised for casualty requirements for the Final F.R.C.S.

Closing date for applications 22nd July.

Royal Hospital

(*b*) NON-RESIDENT REGISTRAR or SENIOR HOUSE OFFICER in General Medicine. Post vacant 23rd September. Grade according to qualifications and experience.

Closing date for applications 13th July, 1957.

(*c*) SENIOR HOUSE OFFICER in Neurology.

Applications to be sent at once.

Applications for the above posts should state age, qualifications and experience, give the names of 3 referees and be sent as follows :—

For posts (*a*) and (*b*) : The Chief Administrative Officer, The United Sheffield Hospitals, West-street, Sheffield, 1.

For post (*c*) : The Superintendent, Royal Hospital, West-street, Sheffield, 1.

SHEFFIELD. UNITED SHEFFIELD HOSPITALS BOARD OF GOVERNORS AND SHEFFIELD REGIONAL HOSPITAL BOARD. Reciprocal Training Scheme for Senior Registrars. 2 Whole-time SENIOR REGISTRARS in Radiology required. 1 with initial tenure of appointment at the City General Hospital, Sheffield, and the Barnsley Group of hospitals. 1 with initial tenure of appointment at the Leicester Royal Infirmary. Candidates should hold a Diploma in Diagnostic Radiology. Appointment for 1 year in first instance and renewable thereafter annually. The successful candidates will be transferred to the Teaching Hospitals for the second phase of the appointment, in accordance with arrangements under the Reciprocal Training Scheme. Renewal of appointment and transfer to the Teaching Hospitals will be subject to satisfactory work and progress.

Further details and form of application from the Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, 10. Forms to be returned by 15th July, 1957.

SHREWSBURY. CROSS HOUSES HOSPITAL. (34 maternity beds.) OBSTETRIC HOUSE SURGEON (pre-registration post), vacant immediately.

Applications, with copy testimonials, to Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury.

SHREWSBURY. ROYAL SALOP INFIRMARY/COPTHORNE HOSPITAL. (500 Beds.) HOUSE PHYSICIAN (pre-registration or otherwise), vacant 1st August, 1957.

Applications, with copy testimonials, to Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury.

SHREWSBURY. ROYAL SALOP INFIRMARY/COPTHORNE HOSPITAL. (500 Beds.) HOUSE SURGEON, vacant 1st August, 1957. Pre-registration candidates eligible. Recognised for the F.R.C.S.

Applications, with copy testimonials, to Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for an appointment as Whole-time REGISTRAR in General Surgery to fill a vacancy in the approved trainee establishment in the Brighton and Lewes Group of hospitals, for duties mainly at the Royal Sussex County Hospital, Eastern-road, Brighton, 7. The appointment, which will be in accordance with the terms and conditions of service of hospital medical and dental staffs (England and Wales), and will be for 1 year in the first instance, is recognised for the F.R.C.S.

Applications, giving particulars of age, qualifications, and experience with relevant dates, together with the names and addresses of 2 referees, to be sent to the Secretary, Registrars Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, W.1, not later than 20th July, 1957.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL (278 Beds), AND SOUTHAMPTON GENERAL HOSPITAL (471 Beds). SENIOR HOUSE OFFICER (E.N.T.) required in August. This post is recognised for the F.R.C.S. (Eng.) and D.L.O. examinations and provides experience in all branches of E.N.T. work. The Group includes a diagnostic and distributing Hearing Aid Centre.

Applications, with copies of recent testimonials, should be forwarded as soon as possible, to the Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (278 Beds.) ORTHOPÆDIC HOUSE SURGEON required. Post recognised for Pre-registration Service and tenable for 6 months. The Hospital is the centre to which all trauma from a large industrial town and port is directed thus providing excellent experience in the treatment of traumatic conditions ; patients with orthopædic conditions are also drawn from a wide area.

Applications, with copies of testimonials, should be sent as soon as possible to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHEND-ON-SEA. GENERAL HOSPITAL. Applications are invited for the appointment of RESIDENT ANÆSTHETIST (Senior House Officer grade) for a period from 1st August, 1957, to 31st March, 1958. Extension of appointment if required. Appointment recognised as fulfilling the conditions of the F.F.A.R.C.S. and the D.A.

Applications, stating age, experience, and qualifications, with copies of 2 testimonials, to be sent to the undersigned not later than 17th July, 1957. J. C. FIELD, Secretary.

SULLY HOSPITAL, Sully, Glamorgan. Cardiff Hospital MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (medical) required at above Hospital, commencing 1st August, 1957. Experience will be gained in investigation and treatment of chest and heart conditions.

Form of application from Group Secretary, Cardiff Hospital Management Committee, 44, Cathedral-road, Cardiff.

ST. ANDREWS. CRAIGTOUN MATERNITY HOSPITAL (48 Beds), AND ASSOCIATED ANTENATAL CLINICS. Applications are invited for the appointment of RESIDENT HOUSE OFFICER at the above Hospital as from 1st October, 1957. The post qualifies for pre-registration and for the D.Obst.R.C.O.G.

Apply, with references, to the Medical Superintendent, East Fife Hospitals' Board of Management, 243A, High-street, Kirkcaldy.

ST. HELENS AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. The following Resident House Officer posts become vacant on 1st September, 1957.

St. Helens Hospital (196 Beds)
HOUSE PHYSICIAN.
HOUSE SURGEONS (2).

Whiston Hospital, Prescot (892 Beds)
HOUSE PHYSICIANS (3).
HOUSE PHYSICIAN (pædiatric).
HOUSE SURGEONS (2).
HOUSE SURGEON (obstetrics).

The above posts are recognised for Pre-registration Service. The surgical posts are recognised for the F.R.C.S. examinations, and the pædiatric post is recognised for the D.C.H. examination.

Applications, stating age, date of qualification and experience, and giving 2 names for reference, should be forwarded to the Group Secretary, Whiston Hospital, Prescot, immediately. Please state for which post application is made.

STOCKPORT. CHERRY TREE HOSPITAL. (Isolation—96 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER, vacant 1st August, 1957.

Applications, stating age, experience, and qualifications, together with copies of 2 testimonials, to be addressed to the Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw-heath, Stockport.

STOCKTON-ON-TEES. THE CHILDREN'S HOSPITAL, Durham-road, STOCKTON-ON-TEES. (84 Beds.) CLEVELAND HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of HOUSE OFFICER, the appropriate salary and conditions of service being in accordance with the Ministry of Health Regulations.

Applications, with copies of 2 recent testimonials, should be forwarded to the undersigned at West Lane Hospital, Middlesbrough, as early as possible. L. BRITTAIN, Group Secretary.

STOKE-ON-TRENT. CITY GENERAL HOSPITAL. (815 Beds.) Whole-time SENIOR REGISTRAR in General Surgery. Resident accommodation available. Unfurnished house may be available for married man. Higher qualification/experience specialty essential. Successful candidate may subsequently be required to spend not more than 2 years in a selected hospital of the United Birmingham Hospitals in accordance with arrangements for interchange of Registrars agreed between the 2 Boards.

Application forms from Secretary, Regional Hospital Board, 10, Augustus-road, Birmingham, 15, to be returned by 22nd July, 1957.

STOKE-ON-TRENT. CITY GENERAL HOSPITAL. (815 Beds.) STOKE-ON-TRENT HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER in Anæsthetics. Previous anæsthetic experience desirable, but not essential. The post offers experience in anæsthesia for all types of general surgery, thoracic and cardiac surgery, including an Obstetric Unit of 60 Beds. Staff includes a Senior Registrar who shares in emergency duties.

Applications, with copy testimonials, to the Group Secretary, Stoke-on-Trent Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. ORTHOPÆDIC HOSPITAL, HARTSHILL, STOKE-ON-TRENT. (78 Beds.) SENIOR HOUSE OFFICER (orthopædics) required. Post vacant 7th September. Duties also at North Staffordshire Royal Infirmary.

Detailed applications, with copy testimonials, to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. SENIOR HOUSE OFFICER (general surgery) required. Post vacant now, 6 months appointment.

Detailed applications, with copy testimonials, to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. HOUSE OFFICER (general medicine) with pædiatrics, vacant July. Pre-registration post.

Detailed applications, with copy testimonials, to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. (455 Beds.) HOUSE OFFICER (general surgery) required. Pre-registration post. Hospital recognised for F.R.C.S.

Detailed applications, with copy testimonials, to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. HOUSE PHYSICIAN (general medicine) with dermatology, vacant July. Pre-registration post.

Detailed applications, with copy testimonials, to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

SWANSEA. MORRISTON HOSPITAL. (501 Beds.) GLANTAWE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER in the Medical Department of the above Hospital.

Full particulars, together with copies of 2 recent testimonials, should be sent to the Medical Superintendent of the Hospital.
T. E. JONES, Group Secretary.

SWANSEA. MORRISTON HOSPITAL. (501 Beds.) GLANTAWE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the resident or non-resident appointment of SENIOR HOUSE OFFICER in the Department of Diseases of the Chest at the above Hospital. The department consists of 82 Beds and caters for tuberculous and non-tuberculous pulmonary diseases as well as cardiac and surgical conditions. There are 5 weekly thoracic surgery operation and bronchoscopy sessions. Close liaison within the Hospital with the General Medical Unit and other special departments affords excellent experience.

Applications, stating age, qualifications, and experience, should be addressed to the Medical Superintendent of the Hospital. T. E. JONES, Group Secretary.

SWANSEA. MORRISTON HOSPITAL. (501 Beds.) GLANTAWE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER in the Department of Neurosurgery at the above Hospital. The department is the centre for neurosurgery for South West Wales and the post offers facilities for the study of neurology for those studying for higher qualifications.

Applications, together with copies of 2 recent testimonials, should be forwarded to the Medical Superintendent of the Hospital. T. E. JONES, Group Secretary.

SWANSEA. MORRISTON HOSPITAL. (501 Beds.) GLANTAWE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER in the Pædiatric Unit of the above Hospital.

Applications, giving particulars of age, qualifications, and experience, together with copies of 2 recent testimonials should be sent to the Medical Superintendent of the Hospital.
T. E. JONES, Group Secretary.

SWINDON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications invited for post of HOUSE OFFICER in Gynæcological Department at St. Margaret's Hospital, Swindon. Vacant 31st July. Post is tenable for 6 months. Offers good experience, and is recognised for the M.R.C.O.G. By arrangement the appointment can be followed by further 6 months post in the Obstetric Department.

Applications to Secretary, 7, Okus-road, Swindon, as soon as possible.

SWINDON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications invited for the appointment of SENIOR HOUSE OFFICER as Casualty Officer and Orthopædic House Surgeon at Great Western Hospital, Swindon. Post recognised by R.C.S. for 6 months of years training under Fellowship regulations. Work of Accident and Orthopædic Department, associated with Nuffield Orthopædic Centre (Wingfield Morris Orthopædic Hospital), Oxford, includes large number of industrial injuries. Salary £819 10s. p.a., less charge for residential emoluments.

Full details and names of 3 referees to Secretary, 7, Okus-road, Swindon, Wilts, immediately.

TREDEGAR GENERAL HOSPITAL, Monmouthshire. RHYMNEY AND SIRHOWY VALLEYS HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEONS required. Surgical Unit under daily supervision of Consultant. Other staff—Junior Hospital Medical Officer. Married quarters.

Apply immediately.

TUNBRIDGE WELLS. KENT AND SUSSEX HOSPITAL. (303 Beds.) Pre-registration HOUSE SURGEON (Male or Female) required. General surgery and gynæcology. Vacant 3rd August.

Apply giving age, qualifications, experience and copies of 2 recent testimonials, to Hospital Secretary.

TAPLOW, near MAIDENHEAD. CANADIAN RED CROSS MEMORIAL HOSPITAL. HOUSE SURGEON required for post vacant 17th July (pre-registration post).

Applications, stating age, qualifications with dates, with copies of 2 testimonials, to Secretary.

TAPLOW, near MAIDENHEAD. CANADIAN RED CROSS MEMORIAL HOSPITAL. HOUSE SURGEON required for Unit of Obstetrics and Gynæcology. Vacant 4th August. Post recognised for M.R.C.O.G.

Applications, stating age, experience and qualifications with dates, with copies of 2 testimonials, to Secretary.

TAPLOW, near MAIDENHEAD. CANADIAN RED CROSS MEMORIAL HOSPITAL. SENIOR HOUSE OFFICER (anæsthetics) required. Post which is tenable for 1 year will be resident.

Applications, with names of 2 referees, to Secretary.

TAUNTON AND SOMERSET HOSPITAL. Musgrove PARK AND EAST REACH BRANCHES. Applications are invited for the post of SENIOR HOUSE OFFICER (anæsthetics), vacant now. This Hospital also possesses a Junior Hospital Medical Officer post in anæsthetics and candidates for this Senior House Officer post will be eligible for promotion to the more senior post after a period of 12 months.

Applications, stating age, qualifications and experience, together with the names of 2 referees, should be forwarded to the Group Secretary, Taunton Hospital Management Committee, Musgrove Park Hospital, Taunton.

TAUNTON AND SOMERSET HOSPITAL. Applications are invited for HOUSE OFFICER (general surgery). Post vacant July, 1957. Recognised for pre-registration candidates, and F.R.C.S.

Applications, stating age, nationality and qualifications, together with the names of 2 referees, should be forwarded to the Group Secretary, Taunton Hospital Management Committee, Musgrove Park Hospital, Taunton, Somerset.

WAKEFIELD. PINDERFIELDS GENERAL HOSPITAL. Applications invited for position of SENIOR HOUSE OFFICER in Thoracic Surgery Department. Salary £819 10s. p.a. £150 p.a. charged for accommodation.

Written applications, giving full personal particulars, details of experience, and 2 names and addresses for reference, to—

W. BOWRING, Group Secretary.

Pinderfields General Hospital, Wakefield.

WARRINGTON INFIRMARY. (172 Beds.) Applications are invited for the post of RESIDENT ANÆSTHETIST (Male or Female) (graded as Senior House Officer), vacant now. The Hospital is recognised for the D.A. examination. Salary is £819 10s. p.a., less a deduction of £150 p.a. for residential emoluments.

Applications, stating qualifications and experience, should be sent to— HENRY L. BOOT, Group Secretary,

Warrington and District Hospital Management Committee.

c/o General Hospital, Warrington, Lancs.

WELSH REGIONAL HOSPITAL BOARD. 2 Registrars (general surgery), Llanelly Hospital, resident. Subject to review end of first year.

Application forms from Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 14 days.

WELSH REGIONAL HOSPITAL BOARD. Registrar in General Medicine, to serve West Wales Hospital Management Committee. Based Pembroke County War Memorial Hospital, Haverfordwest (163 Beds). Might be expected to serve other hospitals in group. Resident/non-resident. Subject to review end of first year.

Application forms from Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 14 days.

WELSH REGIONAL HOSPITAL BOARD. Registrar (paediatrics), Neath General Hospital. Hospital recognised for D.C.H. Resident/non-resident. Subject to review end of first year.

Application forms from Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 14 days.

WEST BROMWICH AND DISTRICT GENERAL HOSPITAL. HOUSE SURGEON, vacant immediately. Pre-registration.

Applications, with 3 recent testimonials, to Group Secretary, West Bromwich and District Hospital Management Committee, Edward-street, West Bromwich.

WEST DORSET GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. ANÆSTHETIC REGISTRAR required for West Dorset Group of hospitals, for duties in Weymouth, Dorchester and Bridport. Post vacant 1st October, and tenable for 12 months, with possible renewal for a further year. Salary according to experience—£935 or £1061 10s. p.a., with deduction of £170 p.a. if resident.

Application form, which should be returned immediately, from the Group Secretary, West Dorset Hospital Management Committee, Damers-road, Dorchester, Dorset.

WESTON-SUPER-MARE GENERAL HOSPITAL. CASUALTY OFFICER (Senior House Officer grade) required for the above Hospital. The appointment is recognised for F.R.C.S. examinations.

Applications, stating age, qualifications, and experience, together with names and addresses of 2 referees, should be addressed to Group Secretary, Weston-super-Mare Hospital Management Committee.

WOKINGHAM. PINEWOOD HOSPITAL. (230 Beds with a Thoracic Surgical Unit.) MEDICAL REGISTRAR required at above Hospital. Bronchitis Unit and beds for non-tuberculous conditions of the chest. Unfurnished flat available; residential quarters for single man or woman also available.

Application forms from, and returnable to, Secretary, Windsor Hospital Management Committee, Alma-road, Windsor, by 20th July.

WORTHING GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTHLANDS HOSPITAL, SHOREHAM-BY-SEA, SUSSEX. Applications are invited for the post of ORTHOPÆDIC REGISTRAR to the Group with duties mainly at Southlands; there are also general surgical duties. Vacant from 15th August, 1957.

Forms of application are obtainable from the undersigned, and must be returned within 14 days from the appearance of this advertisement. A. V. OAKTON, Group Secretary,

Worthing Group Hospital Management Committee.

129, Brighton-road, Worthing, Sussex.

WORTHING HOSPITAL, Lyndhurst-road, Worthing. (210 Beds—Acute general.) Required immediately, HOUSE SURGEON.

Applications from either registered medical practitioners or pre-registration candidates, stating age, qualifications, experience, nationality and enclosing copies of 2 recent testimonials, to be forwarded to the Hospital Secretary immediately.

A. V. OAKTON, Group Secretary,

Worthing Group Hospital Management Committee.

WIGAN AND LEIGH HOSPITAL MANAGEMENT COMMITTEE. BILLINGE HOSPITAL, near WIGAN. REGISTRAR in Psychiatry. The post offers good experience under Consultant Psychiatrist. Main centre at Billinge Hospital where there is an active Psychiatric Unit with modern treatment and over 300 admissions annually. Post recognised for D.P.M.

Applications, with names of 2 referees, to Secretary, Knowsley House, Wigan.

WIGAN AND LEIGH HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER in General Surgery required for duty at Billinge Hospital, Orrell, near Wigan (375 Beds). Post vacant 15th July, 1957.

Applications, with names of 2 referees, to Secretary, Knowsley House, Wigan.

WIGAN AND LEIGH HOSPITAL MANAGEMENT COMMITTEE.

Royal Albert Edward Infirmary, Wigan
3 HOUSE SURGEONS.
HOUSE PHYSICIAN.

Leigh Infirmary
HOUSE SURGEON.
HOUSE PHYSICIAN.

Whelley Hospital
HOUSE PHYSICIAN.

All pre-registration posts—becoming vacant during July.

Applications, with names of 2 referees, to the Secretary, Knowsley House, Wigan.

WIGAN AND LEIGH GROUP OF HOSPITALS. REGISTRAR in Chest Diseases to the above Group. 2 busy chest clinics and opportunity to gain experience in Thoracic Surgical Unit.

Applications, with names of 2 referees, to Secretary, Knowsley House, Wigan.

WHITEHAVEN HOSPITAL, Cumberland. (119 Beds and Annexe of 31 Beds.) HOUSE OFFICER (obstetrical and gynæcological), House Officer or Senior House Officer grade. Vacant beginning of August.

Detailed applications, with dates, and names of 2 referees, to the Group Secretary, Workington Infirmary, Cumberland.

WINDSOR. KING EDWARD VII HOSPITAL. Casualty OFFICER required, Senior House Officer grade. Department forms part of Accident Service of Windsor Group. Duties include House Surgeon to E.N.T. and Eye Departments. Previous experience in treatment of acute injuries desirable.

Applications, stating age, qualifications with dates, nationality, with copies of recent testimonials, to Secretary.

WINDSOR. KING EDWARD VII HOSPITAL. House PHYSICIAN required. Male or Female, for post vacant 11th August. Pre-registration post.

Applications, stating age, qualifications with dates, and nationality, with copies of 3 recent testimonials, to Secretary.

WINDSOR. KING EDWARD VII HOSPITAL. Obstetric AND GYNÆCOLOGICAL HOUSE SURGEON required, Male or Female for post vacant 20th August. Post recognised for both M.R.C.O.G. and D.Obst.R.C.O.G. not a pre-registration post. Successful candidate will be resident at the Old Windsor Unit of the Hospital.

Applications, stating age, nationality, qualifications with dates, with copies of recent testimonials or names of 3 referees, to Secretary by 1st August.

WORKINGTON INFIRMARY, Cumberland. (155 Beds. Pre-registration post. Recognised F.R.C.S. (Ed.).) HOUSE SURGEON (first, second, or Senior House Officer post), vacant end of July.

Detailed applications, with dates and names of 2 referees, to Secretary.

CHANNEL ISLANDS. JERSEY GENERAL HOSPITAL. Applications are invited for the post of CASUALTY OFFICER which will be vacant on 1st September, 1957. The appointment is for 12 months, but is renewable for a further 12 months. Salary £850 p.a., less £125 p.a. for residential emoluments.

Applications to be submitted not later than 13th July, 1957, to the President, Public Health Committee, General Hospital, Jersey, C.I.

B.W.I. UNIVERSITY COLLEGE HOSPITAL OF THE WEST INDIES. Applications are invited for the post of REGISTRAR in the Department of Diagnostic Radiology at the above-named Teaching Hospital. Preference will be given to candidates holding a Diploma in Diagnostic Radiology. The successful candidate will be required to take up duties in October, 1957. The appointment will be for 1 year in the first instance subject to renewal. Salary will be in the scale of £900–£100–£1100–£1200–£100–£1500 p.a., depending on experience, and qualifications. If available, an unfurnished flat will be provided at a deduction of 5% of salary, otherwise a living-out allowance will be paid by the Board. Passage will be provided for 1 person only by sea from the country of recruitment.

Further information may be obtained from the Hospital Manager and Secretary, University College Hospital of the West Indies, Mona, P.O., Jamaica, B.W.I., to whom application, stating age, nationality, and details of qualifications and experience, together with 3 recent testimonials or the names and addresses of 3 referees, should be sent by 30th July, 1957.

B.W.I. UNIVERSITY COLLEGE HOSPITAL OF THE WEST INDIES. Applications are invited for 2 posts of REGISTRAR or SENIOR REGISTRAR in the Division of Obstetrics and Gynæcology at the above-named Teaching Hospital. These posts, which are resident, are recognised for training for Membership of the Royal College of Obstetricians and Gynæcologists. The successful candidates will be required to assume duties on 1st October and 1st November, 1957. The appointments will be for 1 year in the first instance. Salary is in the scale £900–£100–£1100–£1200–£100–£1500 p.a., depending on qualifications and experience. Single accommodation and board may be provided at a deduction from salary at the rate of £145 p.a., or, if available, an unfurnished flat may be provided at a rental of 5% of salary. Passages by sea will be paid from the country of recruitment for 1 person only for each appointment.

Further information may be obtained from the Hospital Manager and Secretary, University College Hospital of the West Indies, Mona, Jamaica, B.W.I., to whom applications, stating age, nationality, details of experience and qualifications, together with 3 recent testimonials or the names and addresses of 3 referees, should be sent not later than 30th July, 1957.

DUBLIN. NATIONAL CHILDREN'S HOSPITAL, 88, Harcourt-street, DUBLIN. The post of MEDICAL REGISTRAR will be vacant on 1st August, 1957. Salary £500 p.a. Applicants must hold the D.C.H.

Applications, with copies of testimonials, must reach the House Governor by 15th July, 1957.

IBADAN, NIGERIA. UNIVERSITY COLLEGE HOSPITAL. The Board of Management invite applications from medical practitioners with experience in modern Anæsthesia for the post of REGISTRAR (Department of Anæsthetics) in the newly completed Hospital.

The salary offered for the post is £1164 p.a., plus an inducement allowance for expatriate officers of £270 p.a.

The appointment will be initially for 1 tour of 12 months and will be renewable by mutual agreement for a further tour of 12 months at a salary of £1212 p.a.

On satisfactory completion of the agreement a gratuity of £37 10s. will be paid for each completed period of 3 months service.

An outfit allowance of £60 is payable on first appointment.

Partly furnished quarters are provided at a rental of 8½% of salary, excluding inducement allowance. A Nigerian officer will be eligible for 5 days leave on full pay for each completed month of service in Nigeria and an expatriate officer will be eligible for 7 days for each completed month.

Free first-class passages to and from Nigeria are provided for expatriate officers and their wives on first appointment, vacation leave and on completion of agreement. Free first-class passages to Nigeria will, in certain circumstances, be provided for non-expatriate doctors.

Candidates will be eligible for children's allowances in accordance with existing regulations.

Arrangements can be made to enable doctors to continue their National Health Service superannuation scheme contributions, and details of the revised salary and gratuity payable in such cases will accompany application forms.

Applications should be submitted not later than 27th July, 1957, on the appropriate forms, which will be forwarded together with further information, on receipt of an addressed foolscap envelope, by the Adviser on Staff Recruitment, London Office (University College Hospital, Ibadan), 57, Catherine-place, Palace-street, London, S.W.1.

U.S.A. CAMBRIDGE, MASSACHUSETTS. Applications are invited for the positions of RESIDENCIES in Anesthesia for a 2-year period beginning 1st July and 1st September, 1957. Salary $1800 first year and $3600 second year and full maintenance. Training in all branches of anesthesia. Affiliation with other hospitals.

Applications, stating age, nationality, qualifications, and experience, together with the names of their referees, should be forwarded to the Director of Anesthesiology, P.O. Box 89, Cambridge, Massachusetts. Travelling expenses to and from the U.S.A. will be paid. Particulars will be sent as soon as application is received. Please enclose recent photograph with application.

Public Appointments

CHESHIRE COUNTY COUNCIL. Municipal Borough of SALE. URBAN DISTRICT OF LYMM. MEDICAL OFFICER OF HEALTH AND DIVISIONAL MEDICAL OFFICER. Applications are invited from registered medical practitioners holding a Diploma in Public Health, or similar registered qualification, for the above permanent full-time joint appointment. The successful applicant will be required to act as Medical Officer of Health for the Municipal Borough of Sale and the Urban District of Lymm and as Divisional Medical Officer and Divisional School Medical Officer under the County Council's scheme of divisional administration. The duties will be five-elevenths Medical Officer of Health and six-elevenths County Council. The salary for the joint appointment will be in accordance with the scale recommended by the Whitley Council for the Health Services (Medical Council "C") which is at present £1871–£2257 p.a. Candidates must possess administrative ability and have a sound knowledge and experience of the organisation of public health services. The person appointed will not be permitted to engage in private practice. The appointment will be subject to the Local Government Superannuation Act, 1953, and the successful applicant will be required to pass a medical examination.

Applications, marked "M.O.H.," stating age, qualifications, and experience, together with the names and addresses of 3 persons to whom reference may be made, should be sent to the Clerk of the Divisional Health Committee, Town Hall, Sale, Cheshire, not later than first post Monday, 29th July, 1957. Canvassing directly or indirectly will disqualify.

ARNOLD BROWN, County Medical Officer.
BERTRAM FINCH, Town Clerk of Sale and Clerk to the Sale and Lymm Divisional Health Committee.
G. BURNIP, Clerk to the Lymm Urban District Council.

DUBLIN. LOCAL APPOINTMENTS COMMISSION. Position vacant. ANÆSTHETIST (part-time), Sligo County Council. Salary £750. Additional payment for attendance exceeding 15 hours a week. Essential qualifications include: (*a*) a recognised Diploma in Anæsthetics or equivalent, and (*b*) adequate experience in the administration of anæsthetics.

Application forms and particulars from the Secretary, 45, Upper O'Connell-street, Dublin. Latest time for receiving completed application forms 5 P.M. on 19th July, 1957.

GOVERNMENT OF THE FEDERATION OF RHODESIA AND NYASALAND. MINISTRY OF HEALTH vacancies for MEDICAL OFFICERS OF HEALTH. Applicants must hold a Diploma in Public Health and experience in schools medical work will be an advantage. Duties will also include environmental hygiene in rural areas and prevention of endemic and epidemic disease. Commencing salary £1700 p.a. on a scale rising to £2050 p.a.

Full particulars and application forms from the Secretary (R), Rhodesia House, 429, Strand, London, W.C.2. Closing date 10th August, 1957.

RADIOTHERAPIST
required by
SASKATCHEWAN DEPARTMENT OF PUBLIC HEALTH
for
ALLAN BLAIR MEMORIAL CLINIC, REGINA

Salary range: $11,000–$13,500 per year (Exchange—£1 = $2.70 approximately).

Requirements.—Radiotherapist with D.M.R. (T.). A full range of therapeutic equipment is in use. A rotating cobalt unit will be installed in the near future. There is an active isotope laboratory. Beds are under the direct control of the Radiotherapist. There are approximately 850 new cancer cases seen annually.

How to apply.—For further information write Dr. T. A. WATSON, Director of Cancer Services for Saskatchewan, Cancer Clinic, University Hospital, Saskatoon, Canada. Applicants should refer to c/c4640.

GOVERNMENT OF THE FEDERATION OF RHODESIA AND NYASALAND. MINISTRY OF HEALTH. Vacancy: PATHOLOGIST. Applications are invited from medical practitioners who have had experience in all branches of clinical pathology including morbid anatomy and parasitology. Salary will be at the fixed rate of £2250 p.a. The successful applicant will be required to administer, or assist in administering, a medical laboratory, and his duties may include the training of medical laboratory technicians. He will also be called upon to do autopsies and medico-legal work.

Further particulars and application forms from Secretary (R), Rhodesia House, 429, Strand, London, W.C.2. Closing date 27th July.

GOVERNMENT OF SARAWAK. Specialist Alienist required to take charge of 200-Bed mental hospital and supervise training of subordinate staff in mental hospital work. Candidates must possess qualifications registrable in United Kingdom and D.P.M., and have had postgraduate hospital experience.

Appointment as follows:—

(*a*) From National Health Service with retention of superannuation rights (3 years in first instance with overall maximum of 6 years) and gratuity (taxable) of 20% of aggregate salary on completion of engagement. Basic salary £2128 p.a. In addition inducement pay of £336 p.a. is payable plus education allowance of £140 p.a. for up to 2 children between ages of 5 and 17 educated outside Sarawak and a child allowance of 7½% of basic salary (maximum £140 p.a.) for married officers with dependent children under age 17, or

(*b*) On contract for 3 years in first instance with gratuity (taxable) of £150 p.a. Salary, inducement pay, and allowances as above plus 10% of basic salary as contract addition.

Partially furnished quarters, when available, at low rental. Free passages for Officer, wife, and up to 3 children under 18 years. Income-tax at local rates.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting No. BCD. 117/24/08).

HER MAJESTY'S OVERSEAS CIVIL SERVICE. Uganda. MEDICAL OFFICERS with qualifications registrable in the United Kingdom required for general duties and to assist in training subordinate African staff. Appointment on permanent basis with pension (non-contributory) and salary £1284–£2115 a year; or on short-term contract, with gratuity, and salary £1503–£2115 a year. Salary starting point determined by qualifications and experience. Gratuity (taxable) for contract service is 13½% of total salary drawn excluding allowances. Pension at rate of 1/600th of final pensionable emoluments for each completed month of service. Candidates in National Health Service may retain superannuation rights up to 6 years and receive gratuity (taxable) of 20% of salary after engagement. Quarters at low rental. Items of hard furniture supplied at additional rental. Free passages in both directions, for officers serving tour of 30–36 months, 4 air passages provided for Officer, wife, and dependent children, or sea passages up to cost of 3 adult fares. Educational subsidies are payable, which vary from £90 a year (or half the school fees, whichever is less), for primary education, to £140 a year (or three-fifths of school fees, whichever is less) for secondary education of first child. An additional £9 payable for second child and £18 for third and subsequent children attending school at the same time (all subject to three-fifths fee not being less than subsidy). Education facilities are available in East Africa, though many parents send their children home to United Kingdom for secondary education. Income-tax at local rates. Local leave is permissible and generous home leave is granted after each tour.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting No. BCD. 117/9/02).

HER MAJESTY'S EMBASSY, MOSCOW. Applications are invited for the post of MEDICAL OFFICER of Her Majesty's Embassy at Moscow. Candidates should be British by birth, under 40, and if married, preferably with not more than 1 child. Surgical as well as medical qualifications are desirable. The duties which would be mainly clinical are to care for the staff of Her Majesty's Embassy and their families, together with a few patients from staffs of other diplomatic missions. A major part of the work is with women and children. A Board to interview suitable candidates will be held towards the end of July and the successful candidate should expect to go to Moscow in September. The appointment would carry with it a taxable salary between £760 and £1230 p.a., depending on the candidate's age and experience; plus the appropriate pay supplement; a non-taxable allowance at present amounting to £1390 for a single man and £2040 for a married couple; free furnished accommodation. The appointment, which would carry with it diplomatic status, would be for 1 year in the first instance.

Write stating age, qualifications and previous appointments to the Ministry of Labour and National Service, Professional and Executive Register, 1–6, Tavistock-square, London, W.C.1, quoting V2/P.E.2270. No original testimonials should be sent.

HER MAJESTY'S OVERSEAS CIVIL SERVICE. Sierra Leone. MEDICAL OFFICERS required for general duties. Candidates must possess medical qualifications registrable in the United Kingdom.

Appointment :—

(*a*) On 3 years probation for permanent and pensionable employment with pension (non-contributory) at rate of 1/600th of the final pensionable emoluments for each completed month of reckonable service.

(*b*) From the National Health Service, candidates retaining superannuation rights up to 6 years, and receiving gratuity (taxable) of 20% of the aggregate of salary.

(*c*) Short-term contract (2 tours each of 18–24 months duration), with gratuity (taxable) of £37 10s. for each completed period of 3 months service, payable on satisfactory completion of appointment.

Salary scale under (*a*) and (*b*) £1006–£1956 a year, and under (*c*) £1138–£2117. Starting salary determined by age, qualifications, and experience.

Quarters normally available at low rental. Return sea passages for Officer, wife, and up to 2 children under 19 years of age or allowance in lieu if children are maintained outside Sierra Leone for the whole of the tour. Income-tax at local rates. Local leave permissible and generous home leave after each tour.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting No. BCD. 117/15/02).

LONDON COUNTY COUNCIL. Visiting Medical Officers. Applications are invited from medical practitioners practising in locality under National Health Service for appointment as Visiting Medical Officers to homes for (*a*) 71 old people at Loughborough-road, Lambeth, and (*b*) 56 old people at Patmore-street, Wandsworth. Remuneration £40 a year in respect of each home plus fees receivable from Executive Council in respect of residents and residential staff who may be taken on National Health Service list.

Particulars and application forms from Medical Officer of Health (PH/DI/1228), County Hall, Westminster Bridge, S.E.1, and returnable by 29th July. Please state for which home application is made.

TREASURY MEDICAL SERVICE. Applications are invited from Medical Practitioners, practising in the districts detailed below, for appointment, in a part-time and mainly advisory capacity, as LOCAL TREASURY MEDICAL OFFICER for each of the places or groups of places shown. The town shown in brackets after the place-names indicates the Head Post Office Area in which the place, or group of places, is situated. Successful applicants will be required to examine and report on the condition of certain Government Officers, teachers, candidates for appointment, &c., who may be referred to them from time to time : and to attend when summoned to an emergency case of accident or sudden illness occurring in a Government office in the neighbourhood. Fees for this work, and mileage allowance where necessary, will be paid on a scale agreed with the British Medical Association.

Intending applicants should write, within 14 days, to Treasury Medical Adviser, Treasury Chambers, Whitehall, S.W.1, for a form on which application may be made. Applicants should be not more than 60 years of age.

The places for which applications are invited are as follows :—

ENGLAND AND WALES

Pontlottyn (Cardiff).
Keighley (Keighley).
London, S.W.7 (South Kensington).
Ebbw Vale (Newport, Mon.).
Merstham (Redhill and Reigate).
Stowmarket and Haughley (Stowmarket).
Malpas (Whitchurch).
March (Wisbech).

SCOTLAND

Clarkston (Glasgow).

NORTHERN IRELAND

Downpatrick (Downpatrick).
Tandragee (Portadown).

WATFORD BOROUGH COUNCIL AND HERTFORDSHIRE COUNTY COUNCIL. DEPUTY MEDICAL OFFICER OF HEALTH AND ASSISTANT COUNTY MEDICAL OFFICER OF HEALTH. Applications are invited from duly qualified medical practitioners, holding the D.P.H. or equivalent qualification, for the posts of Deputy Medical Officer of Health to the Watford Borough Council and Assistant County Medical Officer of Health to the Hertfordshire County Council. The posts are superannuable and together constitute a whole-time appointment. The inclusive salary will be at the rate of £1199 3s. p.a., rising by 8 increments to a maximum of £1597 3s. p.a. Travelling and subsistence allowances will be paid.

Application forms may be obtained from the County Medical Officer, County Hall, Hertford, to whom they should be returned by 19th July, 1957.

GORDON H. HALL, Town Clerk, Watford Borough Council.
NEVILLE MOON, Clerk of the Hertfordshire County Council.

Hospital Services : Non-Medical Appointments

PADDINGTON GENERAL HOSPITAL, Harrow-road, W.9. NON-MEDICAL BIOCHEMIST (Basic grade) required to work under Consultant Biochemist. Candidates should hold university Degree in Biochemistry or A.R.I.C. Whitley Council salary range £475–£845 p.a. plus London weighting. Commencing salary dependent on qualifications and experience.

Applications, stating age, qualifications, experience, together with names and addresses of 2 referees, to be forwarded to Hospital Secretary immediately.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. THE GENERAL HOSPITAL, Steelhouse-lane, BIRMINGHAM, 4. Applications are invited for the appointment of an ASSISTANT BIOCHEMIST (Basic grade) at the General Hospital. Candidates should possess a Science Degree, preferably with Honours in Biochemistry or Chemistry, or the A.R.I.C.

Applications, with the names of 2 referees, should be sent to the House Governor, within 2 weeks of the appearance of this advertisement.

Miscellaneous

A Medical Officer is required to take charge of a clinic being installed in the London Headquarters of a Company with overseas interests. The duties will include supervision of health of London staff and physical examination of both London and overseas staff with other duties as the Company may require. Candidates should be between 32 and 40 years of age and should have had wide experience of clinical medicine ; some knowledge of administration would be an advantage. Commencing salary would be £2400 p.a. with pension benefits and car allowance. The candidate appointed will be encouraged to maintain an association with clinical medicine and will be granted reasonable facilities for this purpose.—Apply by 22nd July giving particulars of qualifications and experience, together with names and addresses of 3 referees, quoting "Med" to Address, No. 307, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

H. J. Heinz Company Limited—Food Manufacturers. Applications are invited from Male registered medical practitioners for the post of Medical Officer to the above Company for their factories in Wigan. In addition to an existing factory employing 1850 workers, a new large factory is nearing completion in the same area which will ultimately employ 3000 workers. The new factory has a comprehensive medical department and the candidate appointed will be expected to develop an occupational health service in the area under the general direction of the Principal Medical Officer. Candidates should be aged about 32 and possess a good clinical background, but previous industrial experience is not essential. Commencing salary £1600 p.a. The salary will be based on the B.M.A. scale for "Medical Officer" grade. A car allowance will also be made.—Applications, with full details of qualifications and experience, together with the names of 3 referees, should be sent to the Principal Medical Officer, H. J. HEINZ CO. LTD., London, N.W.10.

Medical Graduate—Pharmaceutical Research. Applications are invited from medical graduates with an interest in the application of pharmaceutical research to medicine by an old-established British company of fine tradition, but with modern research facilities and outlook, and with headquarters in Edinburgh. The man appointed will be responsible to the Director in charge of research. His responsibilities will include the review of medical fields, liaison with research inside and outside the Company, organisation of clinical trials and advising on medical aspects of the Company's activities. A 5-day week and staff superannuation scheme are in operation.—Applications, with full details of qualifications and career, to Address, No. 304, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Physician required by National Iranian Oil Company for Abadan Hospital to assume charge of Dermatology and Venereal Disease Unit of Medical Division. He will also have charge of beds for internal disease and will assist in Outpatient Department. Previous experience in psychiatry an advantage. Applicants who should be between 35 and 45 should have their M.R.C.P. Salary not less than £2700 nett p.a.—Apply for full particulars to Manager, Personnel Department, IRANIAN OIL SERVICES LIMITED, 3, Finsbury-square, London, E.C.2.

Virginia, U.S.A. Applications are invited from doctors for appointments as Junior Physicians at a large Mental Hospital. Commencing salary $8040 p.a. = approximately £2750. —For further particulars write : ARTHUR SHAW, Medical Agent, Premier Buildings, 88, Church-street, Liverpool, 1.

Wankie Colliery Company Limited. A vacancy exists for the position of Assistant Laboratory Technician at the Wankie Colliery Company Limited Hospital, Southern Rhodesia. This is equipped with modern apparatus and offers scope in the field of medical research. Applicants are required to be either Fellows or Members of the Institute of Medical Laboratory Technologists. The salary offered is £75 per month ; free unfurnished accommodation will be provided together with light, water and fuel. Generous annual and long leave privileges, including annual holiday bonus. In addition there are contributory pension and medical benefit schemes.—Apply giving full details including marital status to : WANKIE COLLIERY COMPANY LIMITED, 40, Holborn-viaduct, London, E.C.1.

3 partners in private London practice seek Assistant with view. English or Scottish M.D. or M.R.C.P., aged about 30. Part-time to yield around £1000 as assistant. Later share by stages to final about £2700 net. Will need capital.—Address, No. 306, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

"Pregnancy Diagnosis by the Xenopus Method," 24-hour service. Send specimens of urine and £1 1s. fee. Hæmatology, Biochemistry, Flame Photometry.—WELBECK BIOLOGICAL LABORATORIES, 26, Park-crescent, Portland-place, W.1 (MUSeum 5386–7).

Applicants for posts requiring testimonials copied or duplicated should communicate with MANTON SECRETARIAL SERVICE LTD., 98, Victoria-street, S.W.1 (Phone : VICtoria 0141), who are specialists in this kind of work.

Typewriting and Duplicating. First-class work at moderate prices by experienced medical typists. Electric machines. —SYBIL RANG, 21, Heath-street, Hampstead, London, N.W.3 (HAM 5329/0504).

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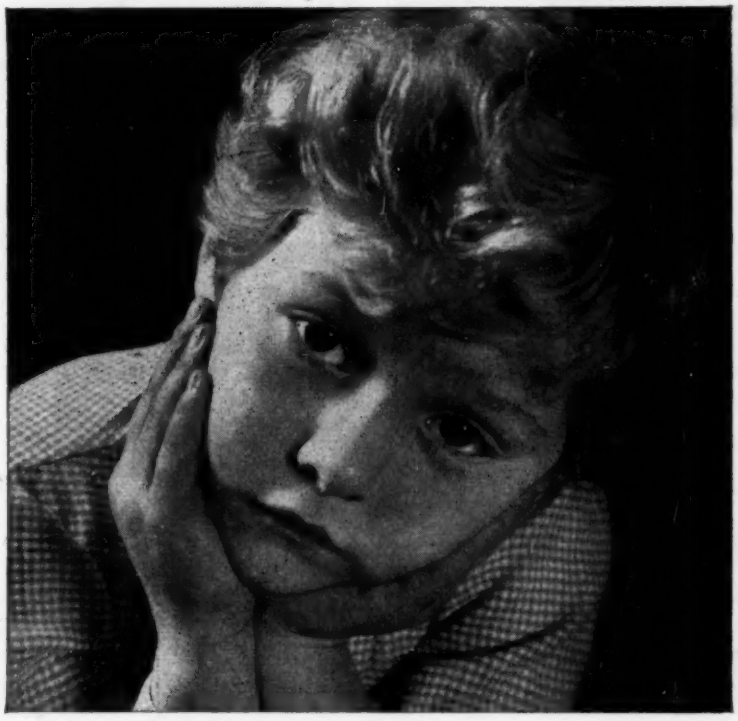


Favoured Treatment

THE little luxuries extended to ailing children do not often include an ingratiating medicine. There is a need for palatable and harmless forms of the drugs given to young patients. Aspirin, one of the commonest, is, for instance, one of the most unpleasant, and can be harmful to the delicate gastric mucosa.

On the other hand, most children will readily take aspirin in the form of *Junior Paynocil*. These tablets are really pleasant to take; they disperse instantly on the tongue without water, and minimise the risk of gastric irritation due to aspirin.

Junior Paynocil tablets each contain 2½ grains of aspirin and 1¼ grains of glycine. Besides speeding disintegration and eliminating the unpleasant aspirin flavour, glycine confers on each aspirin particle a lubricant, demulcent and protective barrier.

Junior PAYNOCIL

Packages

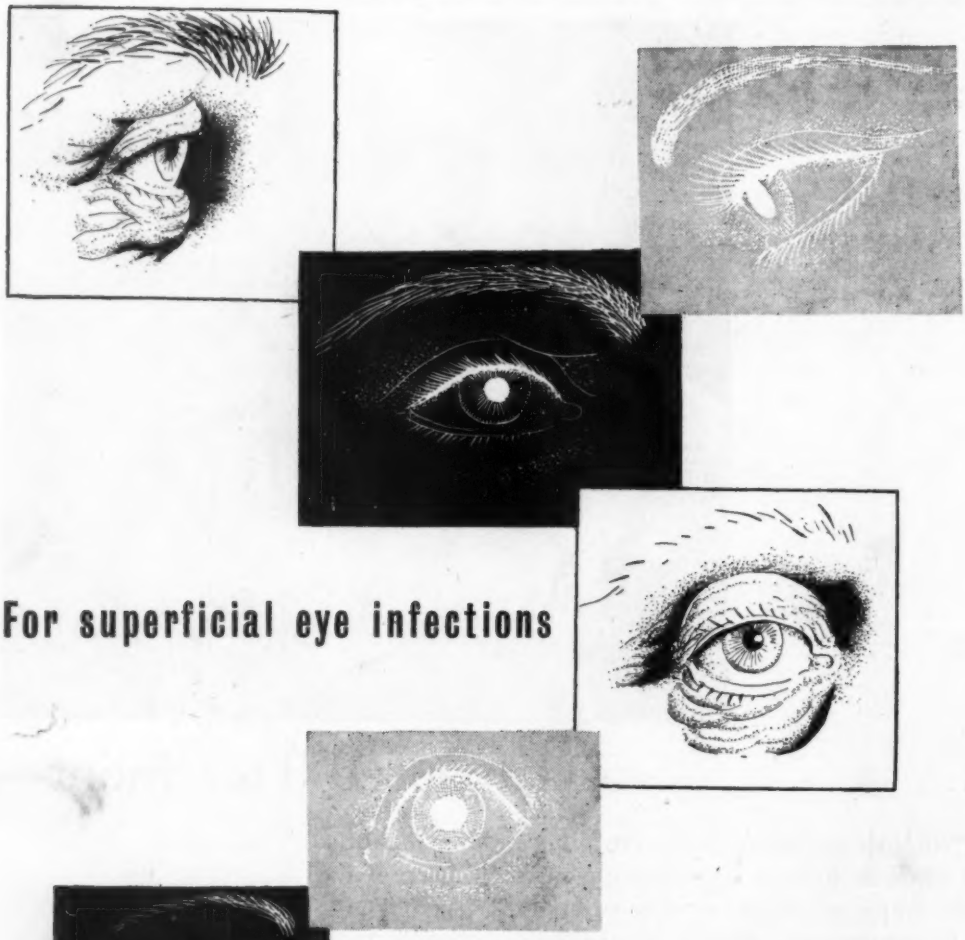
Cartons of 20 in sealed foil strips.

Tax free dispensing packs of 240.

Basic N.H.S. cost: 12/-

PRICE NOW REDUCED

C. L. BENCARD LTD., PARK ROYAL, LONDON N.W.10



For superficial eye infections

An eye ointment with a rapid and intense antibacterial action, 'Brolene' is indicated for use, either alone or in conjunction with Propamidine Ophthalmic Solution in blepharitis, acute and chronic conjunctivitis and corneal ulceration caused by a variety of organisms, and for the prevention and treatment of infection in superficial traumatic eye lesions. It is active against many staphylococci resistant to penicillin and other antibiotics, and its use is much less prone than that of these agents to promote the emergence of resistant strains of organisms. 'Brolene' is active in the presence of blood, pus, and lachrymal secretion, is well-tolerated, readily absorbed on mucous surfaces and unlikely to cause sensitization reactions.

PRESENTATION:

'BROLENE' IS SUPPLIED IN 5 GRAMME TUBES.

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